TECHNOLOGY DEPT.

FOOD INDUSTRIES

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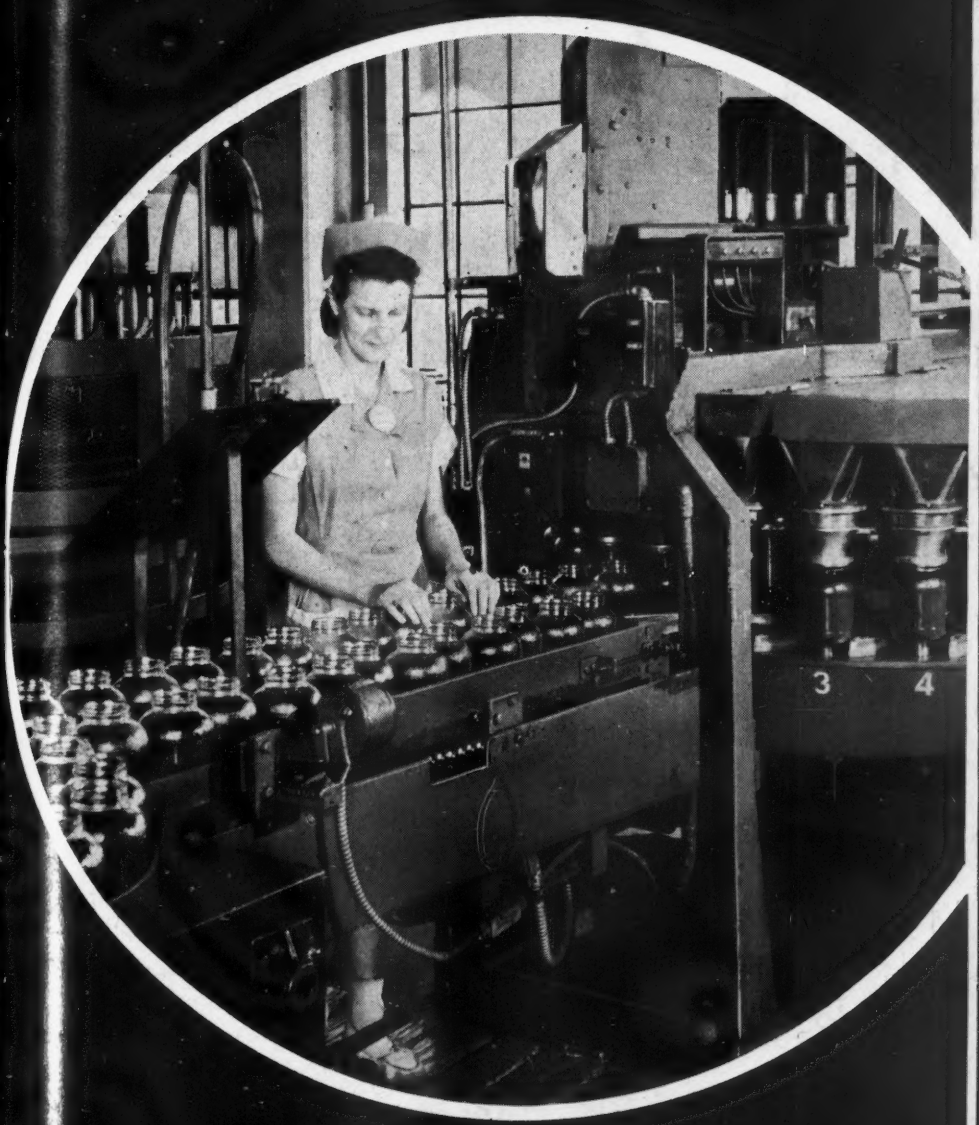
DETROIT

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



JUNE 1943

The Advantages of Brine Peeling

How To Make Better Malt Sugar

Export Cheese Must Be Well Made

New Method Speeds Bacterial Counts

Using Sugar To Best Advantage

Making Jam from SO_2 Treated Fruit

Better Training For New Workers

McGRAW-HILL PUBLICATION

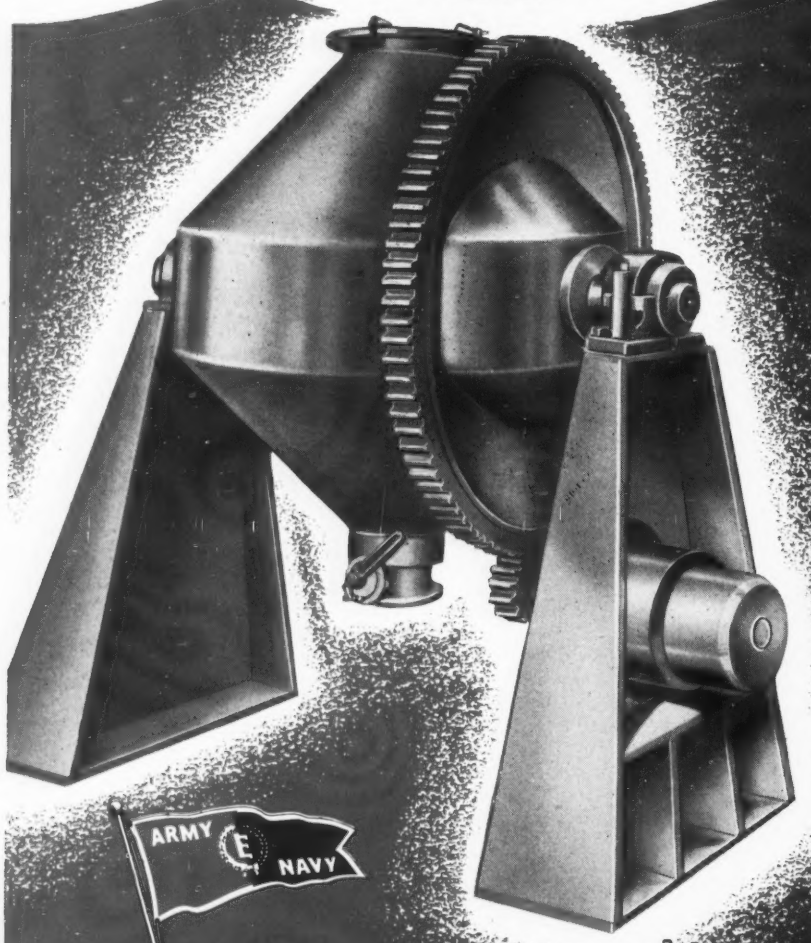
THE NEW PORTER

PATENTED

DOUBLE CONE BLENDER

ELIMINATES LUMPING,

ASSURES FASTER, BETTER BLENDING



Here is another Porter *Exclusive:* A patented double-cone blender device that assures positive, fast, complete, and absolutely uniform blending of dry powders. "Agglomeration," or lumping, is completely eliminated. Design of the blender forces particles of powder to follow divergent paths, thus preventing them from collecting or "balling up", and forcing thorough distribution of all ingredients. The PORTER Double Cone Blender is particularly suitable for blending a minute quantity of material into a large quantity of another. Sturdily built of heavy metal, these blenders are designed to be easily emptied and quickly cleaned, and to give long, continuous service without interruption for overhauling. Complete description of PORTER Blenders and other process equipment on request.

THE TREND IS TO *PORTER BETTER-BUILT* PROCESS EQUIPMENT

H. K. PORTER COMPANY, INC.

PROCESS EQUIPMENT DIVISION

PITTSBURGH, PENNSYLVANIA

JUNE
FOOD TECHNOLOGY

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THE COVER

Shown on the cover is the coffee packing line at the "Maxwell House" plant of General Foods Corp. At right is the filling machine, to the left of which is the conveyor carrying the jars to the capping and vacuumizing operations. Because of the wartime metal shortage, the jars are now closed with paper caps and sealed with cellulose bands.

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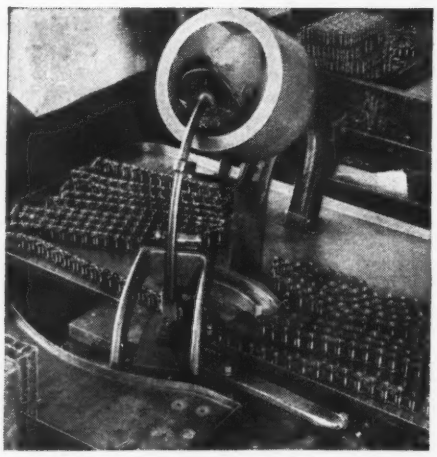
better Methods that use fewer hands



Automatic cotter pin inserting machine for chain belt manufacture assures greater accuracy and uniformity.

Machine design methods, by taking over tedious and laborious tasks in industry, have helped to create in America a civilization which allows men to live as well as to work. An example of progressive machine design that solved a very difficult problem is this Baldwin-Duckworth cotter pin inserting machine for chain belt manufacture. It makes an automatic operation of a task that previously required much hand labor—and at the same time provides greater accuracy and uniformity in the finished product.

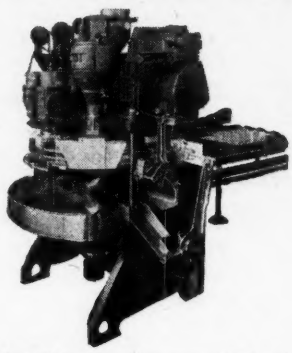
better Drives with Baldwin Roller Chain Belts

This and many other improvements in chain belts are of significance in the solution of drive problems which face both the machine designer and the maintenance engineer. Baldwin Roller Chain Belts insure accurate, split-second timing, deliver virtually 100% efficiency, absorb all shocks and give perfect maintenance of speed ratio. In fact, *roller chain belts are the only type of transmission that can absorb shock loading without loss of speed ratios and efficiency.*

Baldwin-Duckworth offers a comprehensive catalog on roller chain belts for the transmission of power and conveying materials. But for specialized applications involving any machine which you may be designing or redesigning, or which needs greater drive efficiency, call in a Baldwin man. He will be glad to work with you.

BALDWIN-DUCKWORTH Division of Chain Belt Company, 325 Plainfield Street, Springfield, Mass.

EXAMPLE



This packaging machine uses Baldwin Roller Chain Belts for

1. Unfailing split-second timing in operation
2. Perfect maintenance of speed ratios
3. Continuous, jerk-free smoothness of operation

IT'S BALDWIN-EQUIPPED

better Drives through better Methods

BALDWIN

ROLLER CHAIN BELTS

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TO BUILD A TANK — TO FIGHT A HUNDRED BATTLES

TANKS are tough. To build 'em or to fight 'em, a man has to be tough as Tarzan. And a man doesn't keep his back as strong as a steel spring, his eye and hand as swift as light, without plenty of the right kind of chow.

That's where Pneumatic Packaging & Bottling Machines come in. Nourishing foods packaged by Pneumatic are today playing a tremendous part in keeping millions of workers and fighters in there swinging with all their power—in both hemispheres. Wherever victory-vital foods are packaged — medicines, too — Pneumatic equipment is pouring forth an endless river of such supplies with unmatched speed and precision. Just such qualities as these make invaluable the ordnance equipment Pneumatic is engaged in turning out today in record time.

Sound design, precision engineering, and more accurate machining enable Pneumatic machines to perform everywhere like thoroughbreds. If it's a Pneumatic, rest assured it's withstanding the pressure of any overload put on it during the present emergency.

PNEUMATIC SCALE CORPORATION, LTD., 91 Newport Avenue, North Quincy, Massachusetts, New York, Chicago . San Francisco . Los Angeles .

PNEUMATIC
PACKAGING & BOTTLING MACHINERY

If it's a packaging problem, consult Pneumatic first. Semi-automatic and fully-automatic machinery.

CARTON FEEDERS
BOTTOM SEALERS
LINERS
WEIGHERS
TOP SEALERS
TIGHT WRAPPERS
also
SPECIAL COMBINATION PACKAGING UNITS

RIGHT NOW UNCLE SAM is the packer's first market. The needs of Army, Navy, Air Corps and Marines take every precedence. Everything packed for them must be ready for extremes of conditions which would be fantastic in any but wartime.

For example, this Field Ration D is a lifesaving item that looks like a candy bar. Improper packaging might render it as useless as a cast-iron life belt. And here are some of the hazards this package must be ready to meet unfailingly:

- Sub-zero Cold
- Tropic Heat
- Jungle Humidity
- Corrosive Sea Air
- Submersion in Sea Water
- Rough Handling
- Long Storage
- Gas and Smoke

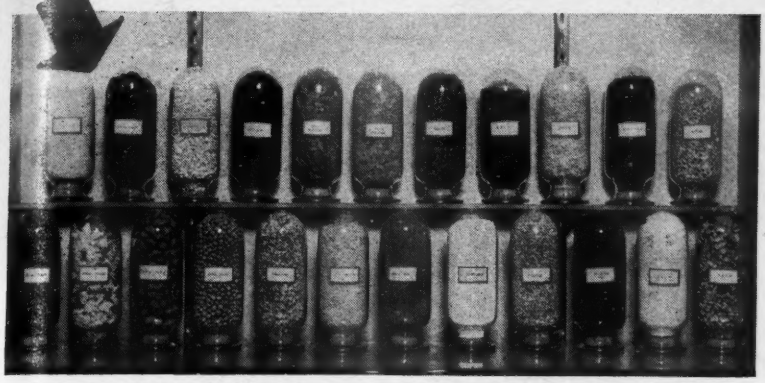
In a future day a similar product, prepared more particularly for taste appeal than concentrated nutrition, will have a different package but one just as definitely designed for its purpose. It will appeal to the sweet tooth; it will be glamorous and attractive; it will be adequately protective; it will safeguard flavor and goodness; and very likely it will be designed by Dobeckmun, as in the past.

Our long experienced package engineers and designers are accustomed to taking problems as they come. Right now they are adding to their experience as they meet war's exacting demands. They will have advanced techniques and developments when peacetime packaging needs again demand satisfaction.

The illustration shows a Dobeckmun "Quadrimatic" cellophane bag heat-sealed within a wax-dipped carton. It is another example of Dobeckmun service in developing the exactly-right package for the specified purpose. If you have such a problem, probably we can help you. Call on us.

THE DOBECKMUN COMPANY
CLEVELAND, OHIO · OAKLAND, CAL.

CHECK WITH LINK-BELT ON FOOD DEHYDRATION



Typical Food Products Processed in a Link-Belt Roto-Louvre Dehydrator:

Carrots	Beans	Cheese, grated	Spices
Sweet potatoes	Bran	Citrus fruit refuse	Sugar
Apples	Bread crumbs	Cotton seed	Sugar beet pulp
Wheat Germ	Bread, sliced	Hominy	Salt
White potatoes	Casein	Malts	Starches
Beef	Cereals	Maize	Soy beans
Pork	Cocoa beans	Molasses feed	Rice
Chicken	Cocoa nibs	Nuts	Rye
Codfish	Coffee beans	Oats	Tea
Almonds	Corn germ	Peanuts	Tobacco
Apple pomace	Corn	Peas	Wheat
Barley	Copra		

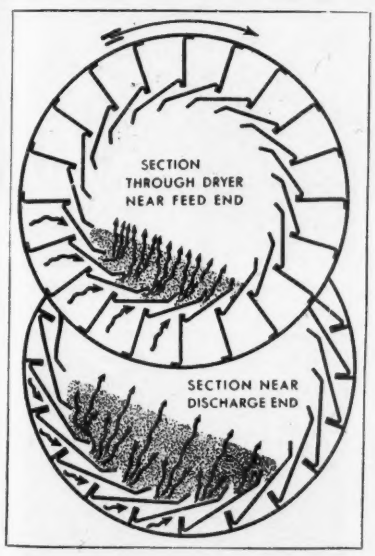
● The Link-Belt Roto-Louvre Dehydrator is the efficient, economical unit for dehydrating food products, meat and vegetables.

Gentle handling, low temperatures, and uniformity of each particle dried, are keynotes for success in dehydration. These features are all embodied in a Link-Belt dehydration plant.

Let us make your present or proposed dehydration plant a producer of quality products on a volume basis.

LINK-BELT COMPANY

Chicago Philadelphia Indianapolis Atlanta Dallas
San Francisco Toronto
Offices, warehouses and distributors in principal cities
9102-A



Thermal input is controlled to suit drying needs

A large volume of dry hot air easily penetrates the relatively thin bed of material near the feed end of the dryer for maximum heat transfer where greatest evaporation can take place. As the material moves forward the bed becomes thicker and the air passages get smaller so that a reduced volume of heated air will penetrate the bed—thus preventing overheating.

A uniform treatment . . . a uniform product

The Roto-Louvre principle of aerated mass-drying produces uniform results because all of the material is treated in the same way at the same time. There can be no stratification or segregation—no "spotty" overdrying or underdrying. Dry heated air penetrates the mass through ever-changing channels that reach to every piece and particle.

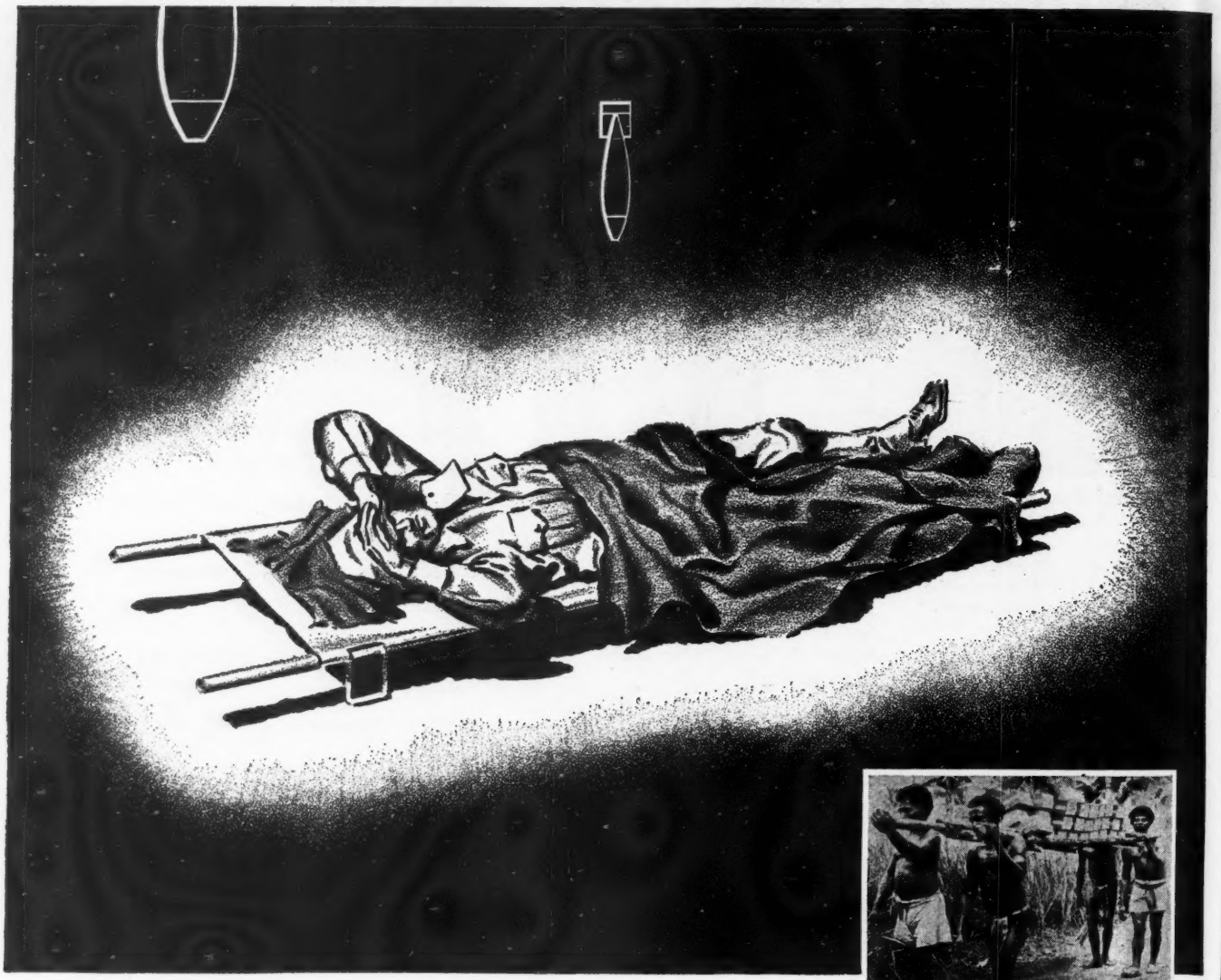
Gradual positive heat transfer

The Roto-Louvre principle greatly lessens the tendency of materials to case harden without sacrificing thermal efficiency or slowing up output. This is accomplished by the initial rapid drying and slower further drying in relatively moist air which occurs in the mass material bed of all of these units.

Roto-Louvre Dryer Dehydrating Vegetables

LINK-BELT ROTO-LOUVRE DEHYDRATOR

GAIR BOXES DELIVER



Blood Plasma, Packed in Paperboard Cases
Acme

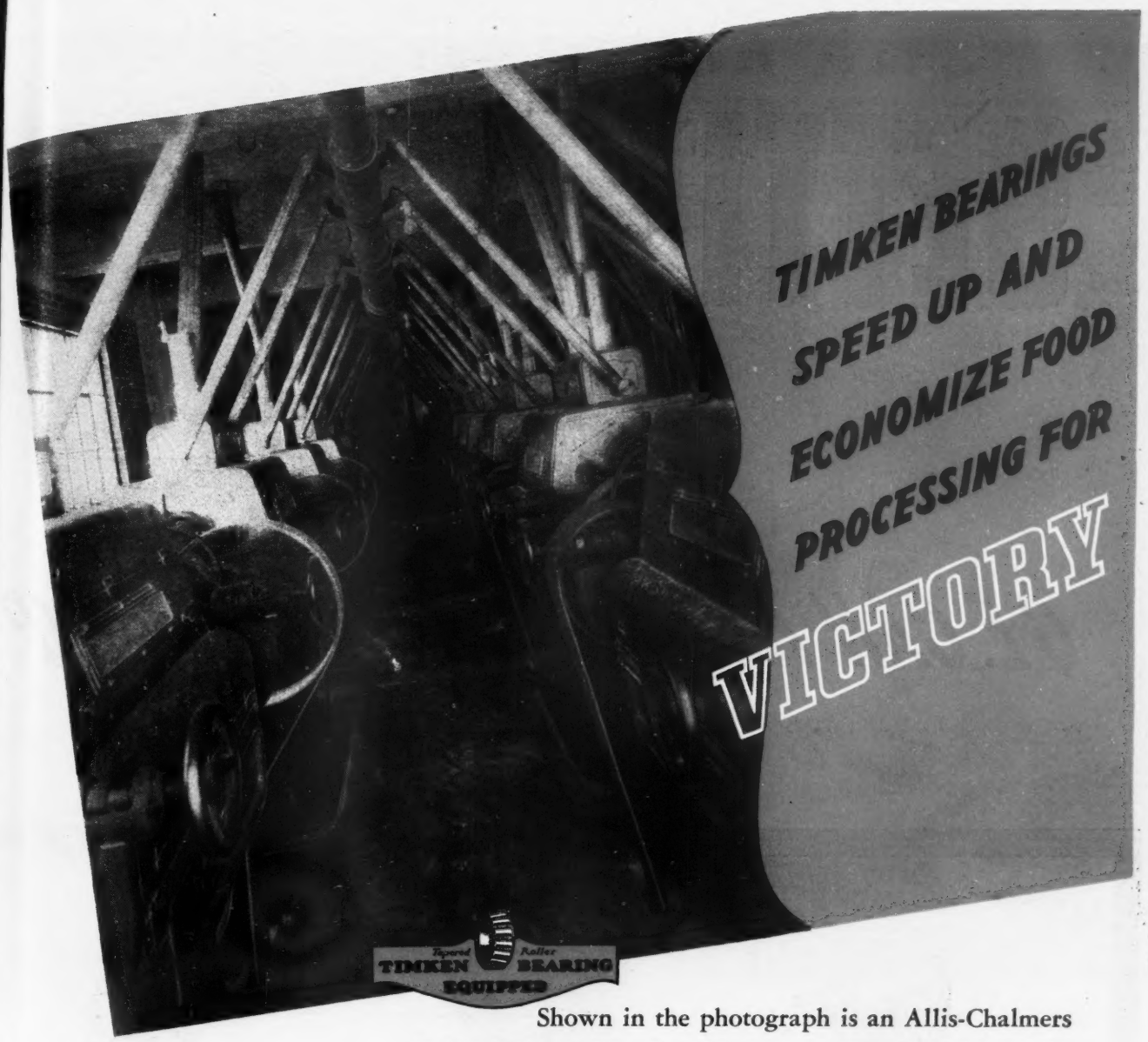
TO OUR FIGHTING FRONTS

Plasma, bullets, bandages or food—these may spell the difference between life and death, victory or defeat for our fighting men. The containers that carry them to their far-flung destinations must be worthy of the responsibility. Gair containers have proven their worth on all fronts, all types of terrain, in all climes and temperatures. Supplies packaged by Gair arrive whole, dry, and perfect, ready to do their job in bringing victory closer.

Write for booklet *showing photographic record of ocean submersion tests made by Gair to meet U. S. Quartermaster Specification No. OQMG-93, Navy Specification 53B11, Lend-Lease Specification FSC-1742-B and FXS-511.*

Robert Gair Company, Inc., New York—Toronto.

FOLDING CARTONS • BOXBOARDS • FIBRE & CORRUGATED SHIPPING CONTAINERS



Shown in the photograph is an Allis-Chalmers Roller Flour Mill of 1500 barrel daily capacity at the Pioneer Flour Mills, San Antonio, Texas. This Timken Bearing Equipped mill was installed over 17 years ago and still is in regular operation, with Timken Bearings giving satisfactory service.

All the essential qualities that bearings for food machinery should have are contained in Timken Bearings. They are (1) freedom from friction, (2) maximum capacity to carry radial, thrust and combined loads—singly and in any combination, (3) ability to maintain moving parts in correct and constant alignment, (4) simplified lubrication, (5) prevention of product contamination through leakage of lubricant. Make sure you have all these qualities in your machines. The Timken Roller Bearing Company, Canton, Ohio.

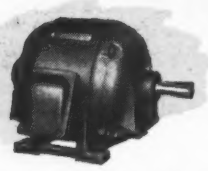
Stabilize your post-victory position now by giving your equipment the ability to meet any competitive challenge. Redesign to use more Timken Bearings.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

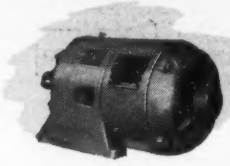
SETTING UP for

G.E. CAN HELP YOU GET "LINED UP"

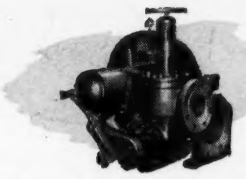
FOR DRIVING POWER



G-E "TRI-CLAD" INDUCTION MOTOR—for cutters, grinders, conveyors—wherever a well-protected standard motor is needed. Available in SPLASHPROOF construction (as shown) for wet locations. Full range of sizes, types, speeds.



G-E GEAR-MOTOR—Motor and speed reducer are combined in a single, compact unit. Simplifies mounting, promotes safety. For any single-speed requirement down to 13.5 rpm.



G-E MECHANICAL-DRIVE TURBINE—Supplies low-cost power while acting as a reducing valve to furnish low-pressure process steam. G.E. builds them in ratings from 5 hp up.

FOR PROCESS CONTROL

G-E MOTOR CONTROL—A popular choice for food-plant drives is the CR7008 combination starter, with circuit switch and fuses in a single self-contained unit. G.E.'s wide range of types meets the needs of every kind of drive.

G-E TIME SWITCHES—They keep tabs on operating cycles, opening and closing contacts as required to hold elapsed time to split-second limits. Easily linked with temperature control in combination time-temperature circuits.

G-E PUSH BUTTONS—G-E Application Engineers can help you select the right accessory control equipment to put an entire processing operation under control from a single station where temperature recorders and other instruments are located.

meat dehydration?

ELECTRICALLY

Has war brought you new food-processing problems? Are you setting up for dehydration of meat, vegetables, milk, or eggs? Are packaging changes altering your production routines? Are you mechanizing your operations to meet a man-power shortage?

Whichever problems in food technology may concern you, G.E. is ready with the engineering help you need to choose the right electric equipment to boost output or improve product quality.

Whether you're planning new developments in dehydration, canning, freezing, or some other process, G-E Application Engineers will work with you to make your entire production line an electrically integrated unit, thus speeding up installation, simplifying operations, and cutting maintenance cost.

A call to your local G-E office will put you in contact with men competent to tackle your particular food-plant electrification problem. *General Electric, Schenectady, N. Y.*

GENERAL ELECTRIC

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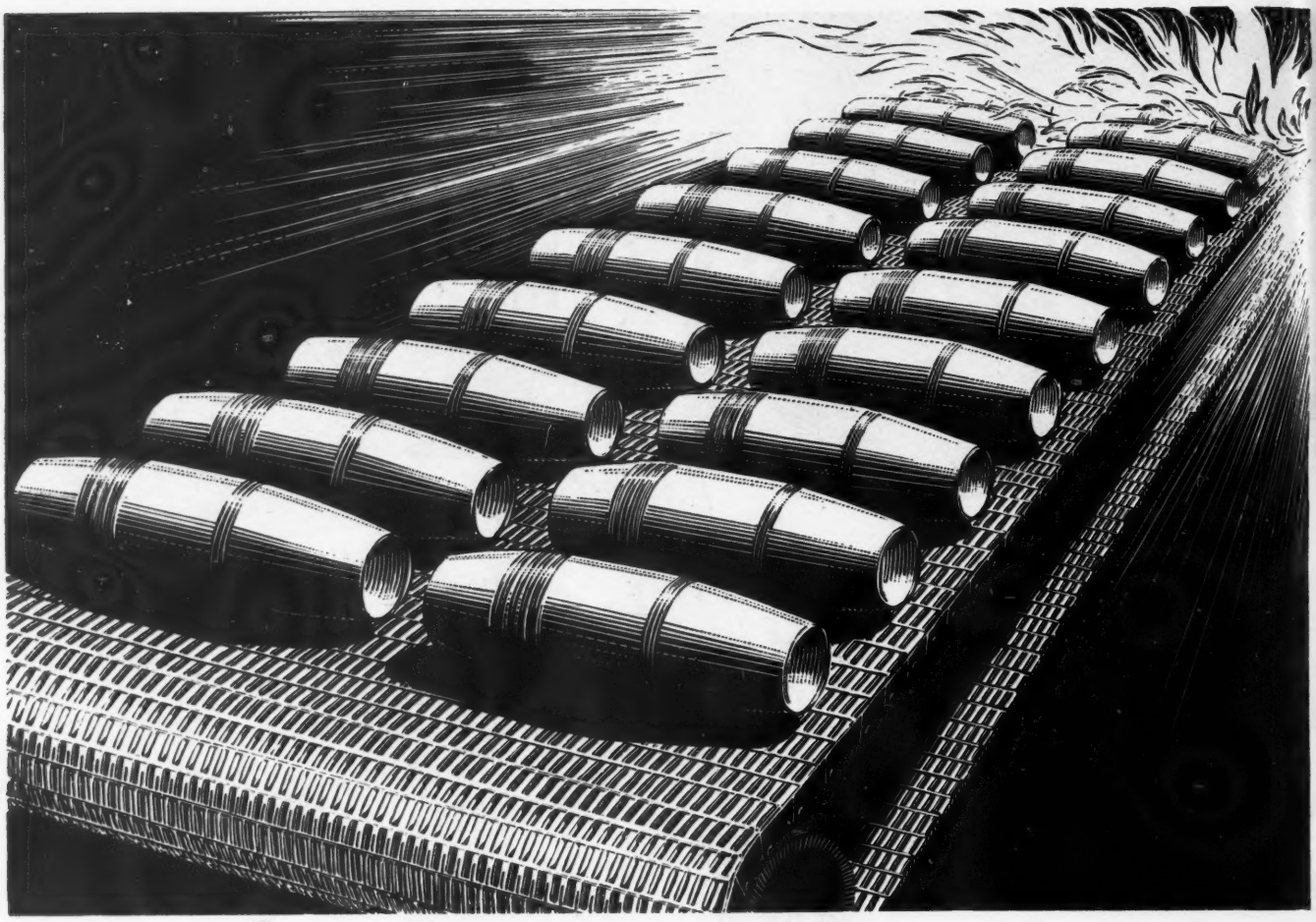
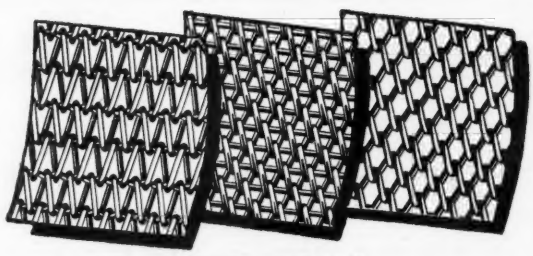


Inferno-Proof Conveyor Belts

The fact that these modern conveyor belts stand up in the inferno of shell-hardening furnaces gives you some idea of the way they can cut time and costs in a host of other applications.

Every Wissco Flexible Metal Belt has back of it 45 years of accumulated experience and pioneering. Each is custom-engineered and manufactured to meet the requirements of a specific job—high or low temperature, abrasion, chemical or other gruelling punishment.

Send for free book "Wissco Metal Conveyor Belts." Wickwire Spencer Steel Company, 500 Fifth Avenue, New York—or Buffalo, Chicago, Worcester, San Francisco.



WHAT DESIGN?

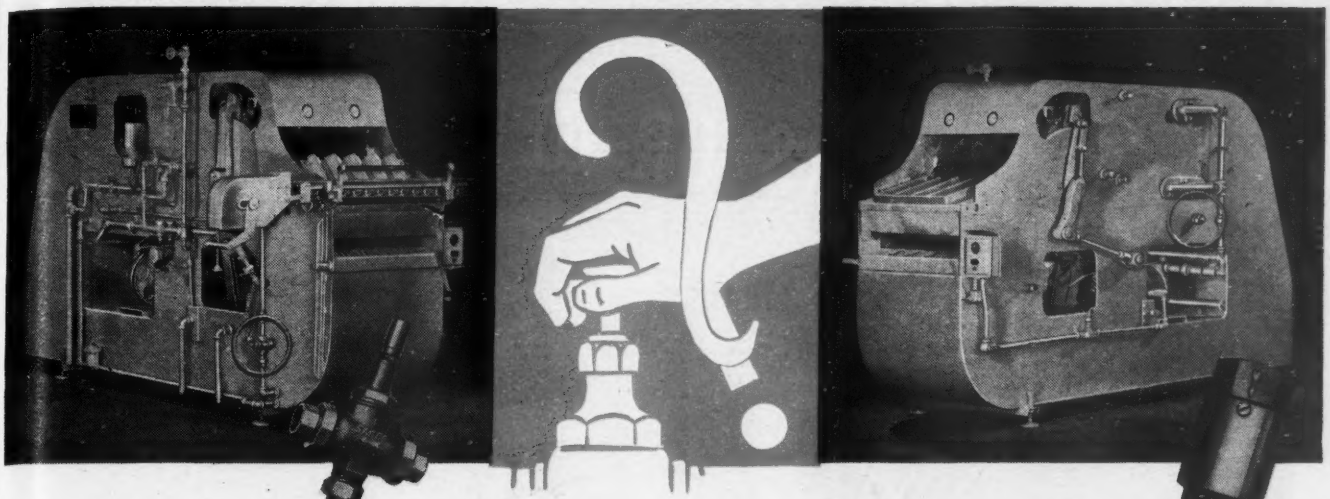
Let Wissco Belt engineers study your conveying problem and specify the best design for your use.

TYPICAL PRESENT APPLICATIONS

Annealing Ovens
Hardening Furnaces
Brazing Furnaces
Degreasing
Dehydrating Food
Canning Operations
Chemical Processing
Decorating Glass, Ceramics
Reclaiming Tin, Rubber, etc.

★ WISSCO ★

CONVEYOR BELTS FOR EVERY PURPOSE



Why Use Your Hands

When 80% of all industrial applications can be regulated by inexpensive

Sarco Temperature Control

A skilled worker is a poor valve tender at best. His active mind and hands are too busy elsewhere — and his time is needed now more than ever before. That's one reason why Cherry-Burrell Corporation equips this ingenious bottle washer with Sarco type TR-50 controls for the wash water and Sarco No. 87S for the rinse tanks. Now every machine that leaves their plant is bound to perform — always the same temperatures — no cracked bottles, no wasted heat or water.

When you buy steam heated or water cooled equipment, ask for Sarco Temperature Control. It will give you the speed and reliability that you need now and the economy you will surely need when the rush is over.

TR-50

This Sarco TR-50 temperature regulator is one of the rigid stem type controls which is inexpensive and recommended for control of heating or cooling where the supply can be piped to the point where the bulb is inserted.

Available in sizes ½" to 2" for temperatures from 50 to 250°F. and steam pressures to 125 lbs. Catalog No. 600.

No. 87 S

This Sarco Thermoton combines a silent steam injector with automatic temperature control at little more than the cost of a steam nozzle. Provides adequate control of water or other liquids heated by direct injection of steam. Available in sizes ½" to 1¼" for temperatures to 250°F. and steam pressures to 200 lbs. Catalog No. 550 also shows Thermoton controls for steam coils and jackets on process equipment or storage tanks.

Manufacturers of Steam Equipment say SARCO is OK—

The only way they can be sure that their machinery will operate at top speed with known efficiency and reliability over a long term of years. Here's a partial list of machinery that is Sarco equipped before it leaves their plants:

- Air Conditioners
- Bottle Washers
- Can Washers
- Chocolate Dip
- Coffee Urns
- Compressors
- Cookers
- Coolers
- Degreasers
- Diesel Engines
- Dryers
- Heaters
- Hot Water Tanks
- Humidifiers
- Kettles
- Pasteurizers
- Plating Tanks
- Preheaters
- Steam Tables
- Stills
- Vacuum Pans
- Vacuum Sealing

Sarco No. 9 Steam Trap on Pure-Pak Sealing Machine.

This booklet describes all types of Sarco heating and cooling controls. Ask for it.

SARCO Saves Steam

SARCO COMPANY, INC., 475 FIFTH AVENUE, NEW YORK

SARCO CANADA, LTD., 85 Richmond Street, West, TORONTO, ONTARIO

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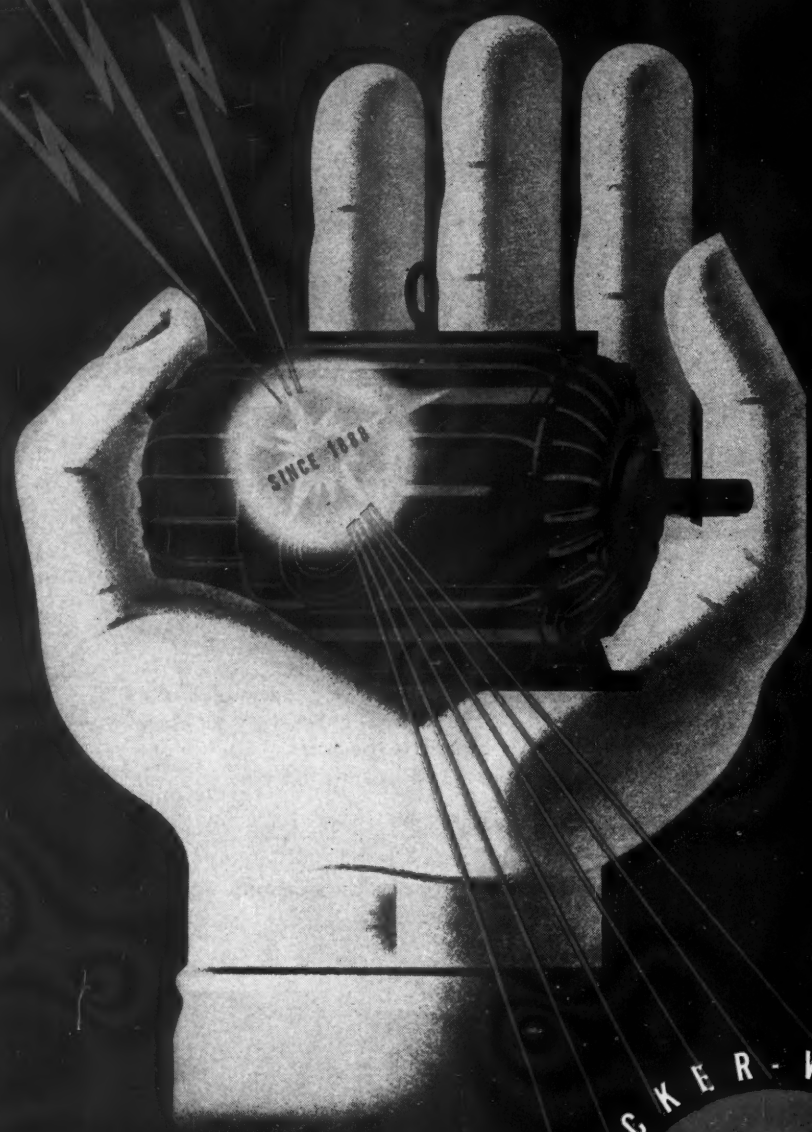
NEED MOTORS OR GENERATORS?



IF you need motors or generators, write or wire us . . . or consult your nearest Crocker-Wheeler office. We can make *immediate* deliveries on some types . . . but regardless of type, we can deliver in faster time than ever before.

New and vastly increased productive facilities, plus expert Joshua Hendy planning are the reasons. Crocker-Wheeler Electric Mfg. Co., Ampere, N. J. Division of JOSHUA HENDY IRON WORKS

CROCKER-WHEELER

TRADE MARK REG. U. S. PAT. OFF.

Be SURE . . . with
CROCKER-WHEELER

Other JOSHUA HENDY IRON WORKS factories at Sunnyvale, Pomona and Torrance, California and St. Louis, Mo.

. . . A PROMISE

There will be a tomorrow! Already the skies are pink with the dawn. The day will bring new problems, fresh solutions—and opportunities to adapt to advantage the changes that are inevitable.

Packaging will be changed. Packages made of new materials have been evolved—in new shapes; new conceptions of packaging machinery to save time, waste and space will emerge. Highly compact machines for tightsealing packages thermoplastically—packages that are siftproof and moistureproof—filled and sealed at the rate of 120 per minute, or faster, will be the order of the day. We cannot supply the machine now—but tomorrow when we *can* supply it, you may need it.

We shall be prepared for you. Just as medical and surgical sciences advance immeasurably under the compulsion of war—compassing years of research within a few months—so the Palmer organization is gaining richly in technical experience and inventive capacity. In our Package Development Laboratory, revolutionary contributions to the design of packages and package machinery have originated—often without precedent, frequently by avoidance of orthodox methods—always with the acceptance of change as the only constant.

Tomorrow we'll have ready —packaging modern as the new day.

PALMER
CHICAGO

FRANK D. PALMER, INC.

528-34 North Western Ave. • Chicago, Ill. • Chesapeake 3344

PACKAGE DEVELOPMENT LABORATORY ★ SPECIAL MACHINERY MANUFACTURERS

Reynolds Metal is Battle-Tested to

Battle for a Beach Head!

This panorama of an imaginative battle portrays a beach head captured by the combined action of offshore bombardment, dive bombers, paratroops and landing force. Enemy has retreated beyond city; positions are being consolidated, materiel landed and base established for continued action. The descriptive captions, keyed to the numbers in the drawing, show multiple uses of the Reynolds Metal New Foil Packaging Material that won a Special Award in the Twelfth Annual All-America Package Competition.

1. FIELD KITCHEN
Dehydrated Beets
Dehydrated Potatoes
Spaghetti
Dehydrated Soup
Hard Candy
Concentrated Cereals
Dried Fruits

2. LIFE RAFTS
Emergency Ration
Bible
Signaling Mirror
First Aid Kit

3. BASE HOSPITAL
Plaster of Paris
Epsom Salts
Plaster Bandage
Dental Stone

4. AMMUNITION DUMP
Ammunition

5. SUPPLY BASE, REPAIR STATION
Tank Parts
Gun Parts
Plane Parts

6. INFANTRY
"K" Ration
Carlisle Bandage
Sulfadiazine Tablets
Benzidrine Sulfate
Matches
Cigarette Pouch
Chewing Gum
Razor Blades

7. ANTI-AIRCRAFT BATTERY
Gun Fire Control Director

8. RECONNAISSANCE PLANE
Photographic Film

9. PARATROOPER
Paratroop Kit
Compressed Rations

10. FIELD DRESSING STATION
Plaster of Paris
Epsom Salts
Plaster Bandage
Dental Stone
Field Dressing

11. SIGNAL CORPS
Radio Parts
Batteries
Teletape

12. SUPPLY BARGE
Water-proof Packages
Floating Ashore

ed to Meet Your Packaging Problems!

ARMOR-CLAD PROTECTION!

Like our fighting men, vital U. S. supplies now go into battle with Armor-Clad protection. On every fighting front, Reynolds Metal New Foil Packaging Material is performing amazing service, safeguarding food, drugs, essential ... supplies.

This new wartime packaging is a solid sheet of metal foil, laminated to cellophane and ... kraft. A protective layer of ... compound, plus a special heat sealing coating, combines with the foil to solve the ... problem. Really Armor-Clad Protection With ... Use Of Steel.

... Reynolds Metals Essay, If you have a ... or a home front product ... problem, let Reynolds help you ... it with this armor-clad protection, applied to your specific needs.

Reynolds Award-Winning Material Meets These Army-Navy Requirements!

1. Positive Protection Against Moisture-Vapor Transmission.
2. Immersion-Proof. Keeps water out!
3. Protection Against Insect Infestation, Odors and Light.
4. Safe Protection for Long Storage Periods.
5. Substantial Saving in ... Steel and Other Strategic Materials.
6. Saving in Space, Especially Shipment and Storage of Supplies.
7. Saving in Weight.
8. Serviceability Under Export Conditions.

REYNOLDS METALS COMPANY • FOIL DIVISION • GENERAL OFFICES • LOUISVILLE • KENTUCKY

REYNOLDS METAL

REYNOLDS ALUMINUM

OUT OF THE GROUND INTO THE SKY

Picking Up

THE THREADS THAT WERE BROKEN!

- With the Jap attack on Pearl Harbor, the normal threads of your business were broken.
- You will never again pick up those same threads.
- Whether the war lasts 2 years or 5 years, every day ages your product and your plant, and changes the buying habits of your customers.
- But the thing that is happening to you is also happening to your competitors.
- You may have gone into this war period on about an equal basis with them. What your relative positions will be when you come out of it will depend on the planning you do *now* for the competitive days of Peace.
- This war's end will see more stainless steel equipment used for economy in operation and for improvement in product. In many plants the dollars available for stainless equipment will be *stretched* by the generous use of IngAclad Stainless-Clad Steel.
- This Borg-Warner Product with a 10-year record of success gives complete stainless protection on the side that is used, and makes your stainless dollars go much further.

Prepare now to "pick up the threads that were broken"

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
310 South Michigan Avenue Chicago, Illinois
Plants: Chicago, Ill.; New Castle, Ind.; Kalamazoo, Mich.

Makers of INGACLAD STAINLESS-CLAD STEEL **"A Borg-Warner Product"**

Conserving Vital Alloys for War and in Peace

Note: We also produce INGERSOLL SOLID STAINLESS STEEL

This can guards war's deadliest weapon

You hear a lot about monster tanks, giant planes, super-battleships. They're impressive, dramatic.

But the weapon called "the most destructive ever invented" weighs less than 100 pounds—and its deadliness is guarded by a "tin can"!

The weapon? A machine gun. The can? A rip-open container called "cartridge case liner" that protects the gun's bullets from *their* enemies.

The enemies of a machine gun bullet are slam-bang handling, dirt, and —very dangerous—moisture. Corroded bullets jam guns. It takes cans to keep machine-gun *and* rifle bullets safe and dry.

America's favorite container is the bodyguard of countless war supplies.

It's helping to protect fighting men, keeping them alive and well. Food, fuel, medicines—all the things you get in cans—are also going to war in cans. And they're getting there—*safe*—because cans are tough!

Remember this when you can't buy all the products you used to get in cans. Remember, too, that the cans of peace will be better cans—thanks to our experience as wartime "Packaging Headquarters for America."

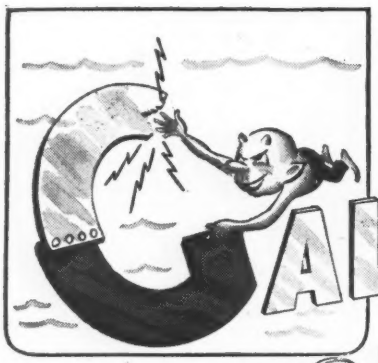
CONTINENTAL CAN COMPANY

FACILITIES FOR WAR WORK

Metal containers are delivering the goods *safely*—foods, supplies, and bullets arrive ready for action. Continental is making millions of these cans along with other needs, including plane parts.

Yet, rushed as we are, we can still take on more! Right now, a part of our vast metal-working facilities for forming, stamping, machining and assembly is still available. Write or phone our War Products Council, 100 East 42nd Street, New York.

HELP CAN THE AXIS—BUY WAR BONDS



GALVANIC CORROSION

OF DISSIMILAR METALS

And how milliampere Gremlins may be foiled at their own game

Today, dissimilar metals must frequently be used in more or less untried combinations. This is made necessary by metal shortages and urgent production needs.

Such combinations when exposed to liquids or moisture can result in serious galvanic corrosion. Therefore galvanic couples now merit much closer attention by plant and design engineers than was previously necessary.

Also, since its effects are not readily distinguished from those of the ordinary types of corrosion, it frequently is blamed for troubles it could never cause. Yet when really present, galvanic corrosion may be very serious.

Practices for controlling Galvanic Corrosion

1 Select combinations of metals as close together as possible in the Galvanic Series.

2 Avoid combinations where the area of the less noble material is relatively small. It is good practice to use the more noble metals for fastenings or other parts in equipment built largely of less corrosion resistant material.

3 Insulate dissimilar metals wherever practical. If complete insulation cannot be achieved, anything such as paint or plastic coatings at joints to increase the resistances of the circuit will help.

4 Keep dissimilar metals as far apart as possible. This rule applies even when the actual connection between the metals is made external to the corrosive liquid.

5 Apply coatings with caution. For example, when painting—do not paint the less noble material without also coating the more noble, otherwise greatly accelerated attack may be concentrated at imperfections in coatings on the less noble metal. *Keep such coatings in good repair.*

6 Prevent or limit aeration of the corrosive liquid as much as possible to sustain the polarizing effect of the hydrogen film which forms on bare cathodic surfaces.

7 If practical, add chemical inhibitors to the corrosion solution according to the nature of the solution to be inhibited.

8 Avoid joining materials well apart in the series by threaded connections, as the threads will probably deteriorate excessively. Brazed joints are preferred when practicable.

9 Whenever possible, install relatively small replaceable sections of the less noble material at joints and increase the thickness of the less noble material in such regions; for example, by using extra heavy wall nipples in piping or by attaching replaceable pads to critical surfaces.

10 Install pieces of bare zinc or steel to provide a counteracting galvanic protection effect to suppress galvanic corrosion.

•

INCO's Technical Service is prepared to assist metal users in solving galvanic corrosion problems. Available data from INCO's Corrosion Files for a particular combination of metals will be furnished wherever possible. Aid can also be extended in applying general principles to specific problems.

As a first step in securing INCO's help on a specific corrosion problem, write for a copy of the Corrosion Data Work Sheet.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York, N. Y.

GALVANIC CORROSION *and* THE GALVANIC SERIES

Galvanic Corrosion is caused by contact or connection of unlike metals in a corrosive liquid. Because generation of electric current is associated with galvanic corrosion, the metals act like a galvanic cell and corrosion action may become more serious and more rapid than that fostered by the corrosive liquid acting on the metals separately. Such action may be prevented or minimized by using the Galvanic Series to guide the selection of metal combinations.

GALVANIC SERIES

Corroded End (anodic, or least noble)

Magnesium
Magnesium alloys

Zinc

Aluminum 2S

Cadmium

Aluminum 17ST

Steel or Iron
Cast Iron

Chromium-iron (active)

Ni-Resist

18-8 Stainless (active)
18-8-3 Stainless (active)

Lead-tin solders
Lead
Tin

Nickel (active)
Inconel (active)

Brasses
Copper
Bronzes
Copper-nickel alloys
Monel

Silver solder

Nickel (passive)
Inconel (passive)

Chromium-iron (passive)
18-8 Stainless (passive)
18-8-3 Stainless (passive)

Silver

Graphite
Gold
Platinum

Protected End (cathodic, or most noble)

According to studies and practical experience from which the Series resulted, metals within a group have no strong tendency to produce galvanic corrosion of each other and therefore make relatively safe combinations unless the area of the less noble is markedly smaller.

The coupling of two metals from different groups and distant from each other in the list can result in galvanic, or accelerated corrosion of the less noble material. The farther apart the metals stand, the greater will be the galvanic tendency.

Although the arrangement of metals in the Series is based on results of experiments and practical experience involving many common corrosives, it cannot replace the need for tests when unusual corrosives are encountered or when other unusual conditions prevail that may cause major shifts of the relative positions of metals in the Series.

AN AMERICAN INSTITUTION WORKING WITH AND FOR AMERICA

No sentinel of the skies could more conscientiously perform his patriotic duties than does every veteran in Rhinelander's army of papermakers. The unparalleled importance of food protection papers in expediting America's war effort demands an alertness in production that extends progressively from pulpwood to finished product. The momentous task of food conservation is a major Government aim to which fortunately we can bring a wealth of experience augmented by highly skilled personnel and completely modern productive capacity. Constantly we strive to improve on past performance, and shall continue so for the duration and beyond into the post-war days when peace again abides with us.

Folke Becker

PRESIDENT
RHINELANDER PAPER COMPANY

RHINELANDER
PROTECTIVE PACKAGING
Papers

FROM THE BEST THAT'S MADE TO THE CHEAPEST THAT'S GOOD

Genuine Greaseproof
Coffee Bag Papers
Confectionery Papers

Cereal Wrapping Papers
Laminated Greaseproof Papers
Lard and Shortening Liners

Bakery Product Wraps
Cracker Box Liners
Greaseproof Innerwraps

Wax Laminated Glassine
Opaque Label & Bag Glassine
Packing Industry Wrappings

RHINELANDER PAPER COMPANY • MILLS AT RHINELANDER, WISCONSIN, U.S.A.

CENTURY FORM J MOTOR

Protection Against Falling Solids and Dripping Liquids

The top half of the motor is closed. Cooling air enters at both ends and is discharged below the shaft line.

The upper half of the Century Form J general purpose, open, continuous duty motor is closed to minimize the possibility of dripping liquids or falling solids entering the vital parts of the motor.

This added protection feature is made possible because of the scientifically designed Century mechanical ventilation system. All motors generate heat, so if the insulation is to have long life, the heat must be rapidly carried away from the windings. Two powerful fans located behind each bearing bracket draw cooling air "IN" through the bearing bracket openings. This cooling air is deflected first around the bearings to keep them cool and then across the windings and to air passages between the outer surfaces of the magnetic core and the frame—the heated air being finally discharged "OUT" through the openings located at the sides and bottom of the frame.

These modern, protected, industrial, general purpose motors meet the requirements of more than 80% of all polyphase motor applications. This Form J construction is at present available in 2 to 15 horsepower four-pole frame sizes.

Your Century Motor Specialist has full information and his wide experience may well prove valuable to you. We suggest you call him in today.

Century MOTORS

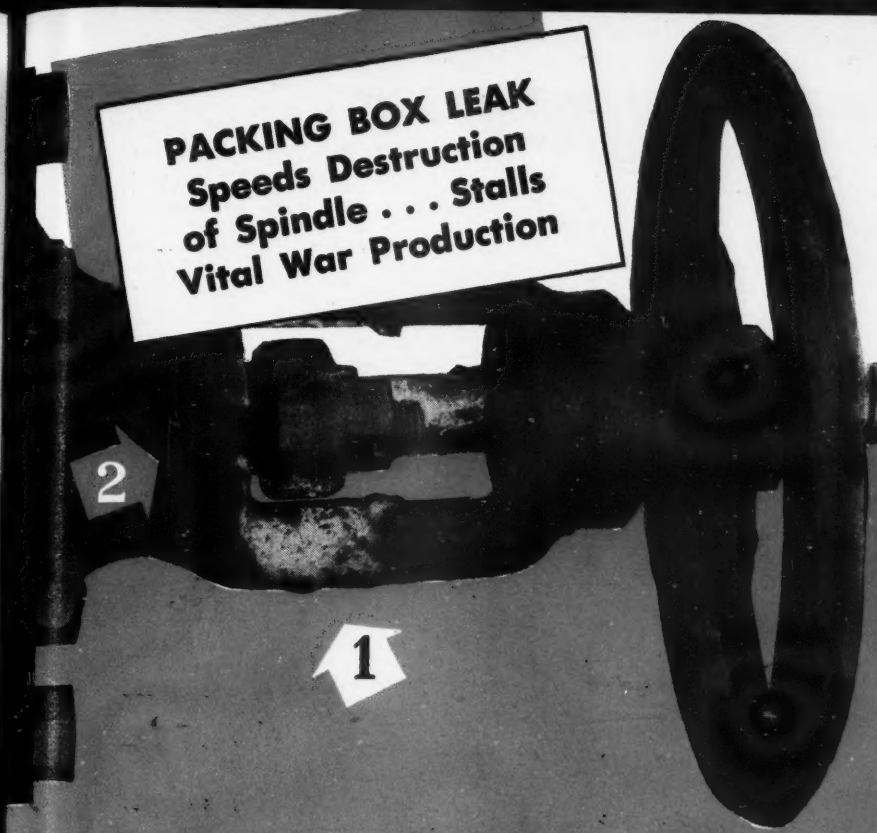
Help You Beat the Production Promise

CENTURY ELECTRIC CO., 1806 Pine St., St. Louis, Mo.

Offices and Stock Points in Principal Cities

318

One of the Largest EXCLUSIVE Motor and Generator Manufacturers in the World.



Prevent Valve Failure *before it starts!*

A neglected leak in the packing box of the valve illustrated corroded the spindle so badly it had to be replaced.

The crusted scale (1) indicates that the leak was apparent for a long time. It is also evident that the gland has been tightened to the limit (2) by someone who believed he was checking the leak by compressing the packing. Instead, the packing was simply jammed into a hard, dry mass.

While the spindle was being replaced, it was necessary to close the main steam line and interrupt production in a plant buzzing with war work.

Waste of production hours through preventable valve failure is inexcusable today, since delay in the delivery of war materiel may eventually spell defeat for our armed forces. Equally serious is the waste of critical metals by needless destruction of valve parts. Such waste can be effectively controlled by an adequate program of valve conservation.

Make sure that valves are inspected regularly – that worn parts are repaired or replaced before a valve destroys itself. Maintenance workers should be instructed thoroughly. Valves for new installations should be selected carefully, and properly installed.

Recommend an effective system of valve conservation to the plants you serve. Jenkins Engineers will provide any assistance you need upon receipt of details of present valve problems.

Jenkins Bros., 80 White St., New York, N. Y.; Bridgeport, Conn.; Atlanta, Ga.; Boston, Mass.; Philadelphia, Pa.; Chicago, Ill. Jenkins Bros., Ltd., Montreal; London, England.

Packing Box Leaks are Easily Corrected by Proper Maintenance

Frequent inspection will reveal the tell-tale drip where the stem enters the packing box, which indicates faulty packing. First, tighten packing box by applying ordinary effort to gland nuts. Then if leak continues, the valve should be repacked.

When repacking, all old packing should be removed and replaced with new material of the proper type. Leaks often result from wrong packing.

If valves are used infrequently, or if internal conditions are unfavorable, it is advisable to keep a live load on the packing. Steel springs with two or three coils, installed between the packing nuts and gland (see 3), will keep packing compressed and compensate for varying conditions. Packing box leaks are just as troublesome in small valves as in large. Excessive tightening of the packing nut will not remedy the condition when repacking is necessary, and may damage the packing nut.

Smooth spindles are important to prevent leaks and preserve life of packing. Spindles should be kept clean and protected from scratching and scoring.

JENKINS VALVES

SINCE 1864

For every industrial, engineering, marine and power plant service . . . in Bronze, Iron, Cast Steel and Corrosion-Resisting Alloys . . . 125 to 600 lbs. pressure.

This advertisement is one of a series appearing regularly in national periodicals, farm publications and prominent city newspapers. Reprints in color are available for your use. Write us for them.

From a full-color painting by Peter Helck for Republic Steel.

BELLY FULL OF BULLETS—but every man alive!

Tex., reported not one man of the 10 aboard the bomber received as much as a scratch. One of the bomber's engines was shot up, however, and there were bullet holes in the fuselage. It was this bomber's first encounter with Jap Zeros.

(clipped from a recent issue of the Cleveland Plain Dealer)

Unusual news? Once it was, but not today! Items like this are appearing almost every day—telling of the miraculous ability of American bombers to reach their objectives through a deadly hail of enemy fire—and return with every man alive.

★ ★ ★

American planes are proving their fighting ability in the skies over most of the globe. They can take it as well as dish it out.

Scores of American flyers in all parts of the world owe their lives to armor plate at vital points in planes—armor plate *tough* enough to stop enemy bullets and *light enough to fly* high.

The quality of these planes is a tribute to the American system of industry. The volume of their production is amazing—from 20,000 in 1941 up to 49,000 in 1942—more planes than we produced in the 23 years preceding this war.

This production job would not have been possible without vastly increased tonnages of the fine steels necessary for engines, fuselages, propellers, landing gear, armor and armament.

Free American industry has done a far greater war production job in two years than Hitler's "efficient dictatorship" could do in *ten* years! And not because we are a race of supermen, but because we are *FREE* men.

In these same two years, Republic's electric furnace capacity for making "Aircraft Quality" steels, light armor plate and other fine alloy steels increased more than 700%. Output of steel plates for ships was boosted 500%. A huge stream of peacetime products was diverted into a record-breaking flood of war steels and steel products.

Until we win the victory that will insure our American way of life—freedom to live as we choose, to speak, worship and work without fear or want—Republic will continue its "full-out" war effort.

After that, Republic will utilize its past experience, enlarged facilities and new knowledge gained in wartime production and in increasing research to provide more steel, finer steels to further enhance what we have always thought was the best Country in which to live.

You and we owe it to our sons and brothers in uniform that they shall return to an America that is worth their sacrifices—an America that will grow even greater and stronger because it is *FREE*. Let's see to it that our job is done—*WELL!*

REPUBLIC STEEL CORPORATION

General Offices: Cleveland, Ohio

Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, N. Y.

REPUBLIC STEEL — PRODUCTION FOR VICTORY

Republic

ENDURO STAINLESS STEEL

Sheets—Plates—Roofing—Upson Bolts, Nuts, Rivets—
Pipe—Electrunite Condenser and Heat Exchanger Tubes

Tanks by the thousands are rolling off America's production lines — ready to be turned over to valiant fighting men eager to crush the foes of Liberty. Free men working in plants conceived and equipped under a system of free enterprise are producing this vital equipment. Howell Motors are playing a vital part in production, too — not only in the tank industry but in the manufacture of planes, ships, machine tools, air handling equipment as well as in the food and dairy industries.

The Electric Motors that made millions of cars now turn out Tanks

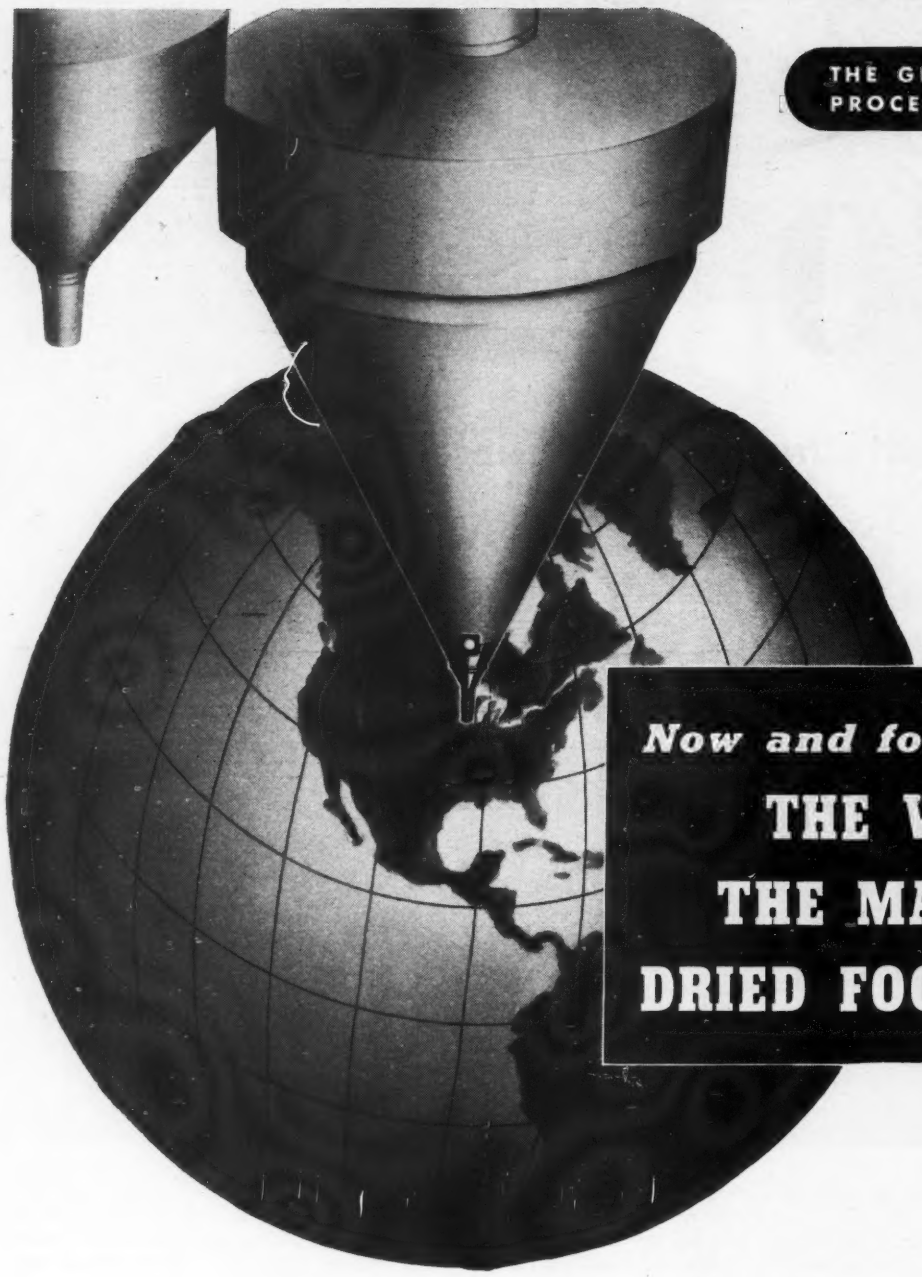
The mass production of tanks for our Armed Forces in the numbers now needed requires heroic production efforts . . . and it takes well equipped plants. The automobile industry has accepted a big share of this responsibility — adapting methods and machines to tank production.

Many Howell Motors that operated machinery to make millions of cars are still going strong after years of constant service. More Howell Motors are being added for expanding war production in these and other plants.

In ordering electric motors of any make for your war job, you should specify the simplest, lowest horsepower motor that will meet your requirements. Do this in compliance with War Production Board regulations, in the interest of conservation of critical materials, and to obtain quicker delivery.

When you use Howell Electric Motors, you can "load" them with full confidence in their ability to stand up under the toughest jobs within the limits of safety. Howell Engineers will gladly aid you in selecting the recommended "wartime emergency capacity" motor for your individual requirements. Call in a Howell Representative or write the factory today.

HOWELL ELECTRIC MOTORS COMPANY
HOWELL • *Manufacturers of Quality Motors Since 1915* • **MICHIGAN**



THE GRAY-JENSEN SPRAY PROCESS DRYING PLANT

Now and for years to come

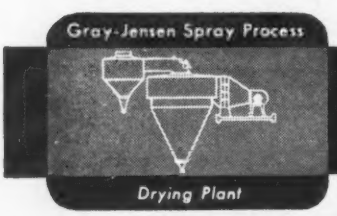
THE WORLD IS THE MARKET FOR DRIED FOOD PRODUCTS

The present record-breaking world-wide demand for dried milk, dried egg and other dehydrated food products is only the beginning. For years to come, it will continue to be big business. Now is the time to investigate the profit possibilities for your company, your co-operative or your community.

To get maximum output of natural flavor, extra grade dried whole or skim milk, dried egg and other food products at the lowest manufacturing cost per pound of powder produced, let skilled Douthitt engineers design and install complete, a Gray-Jensen Spray Process Drying Unit for you.

Inquiries are given prompt attention. Write today for further details.

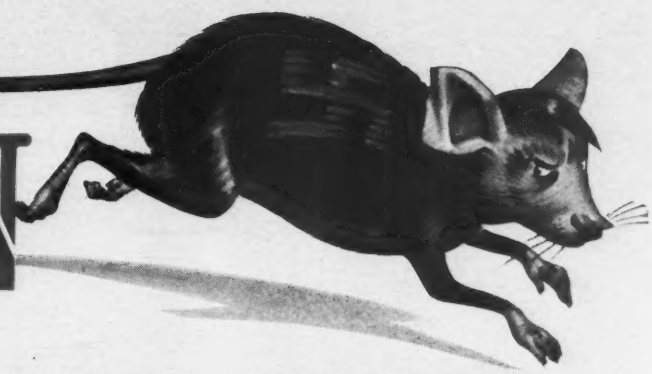
THE DOUTHITT CORPORATION, 221 N. LA SALLE ST., CHICAGO, ILL.



The **DOUTHITT CORPORATION**

CHICAGO, ILLINOIS

RAT POISON



THAT COMES PACKAGED IN SPIRAL-WOUND PAPERBOARD TUBES

Millions of these smooth, round tubes are rushing potent poison to the fronts . . . and the Axis rats are getting a good taste of it.

For these tightly-wound, tightly-sealed paperboard containers protect shells and grenades against desert dust and tropical moisture . . . keep them in prime condition to do a deadly job.

On every front, Gardner-Richardson precision-engineered paperboard is helping deliver supplies where they are needed—quicker and in greater quantities. For more shells, foods and ordnance parts can be loaded into a ship or transport plane when packaged in lightweight, compact paperboard containers.

All of Gardner-Richardson's research and packaging development facilities are now being devoted to the needs of war, for the fighting forces as well as civilian essentials. And you may be sure many of these wartime developments will some day mean finer packages for the products of peace.

GARDNER-RICHARDSON — FROM PULP TO FINISHED PRODUCT — ENGINEERED PRECISION

The GARDNER-RICHARDSON Co.

Manufacturers of Folding Cartons and Boxboard

MIDDLETOWN, OHIO

Sales Representatives in Principal Cities: PHILADELPHIA • CLEVELAND • CHICAGO • ST. LOUIS • NEW YORK • BOSTON • PITTSBURGH • DETROIT

O.W.I. by Palmer, in an Allegheny Ludlum Plant

GRAY... *and Skilled*...

IN THE SERVICE OF STAINLESS STEEL

THE production of alloy steels is essentially a matter of technique. Many of them are complex, metallurgically; and all of them are compounded to a nicety and processed to specific requirements of surface finish and physical properties.

More often than not, the ability to produce these alloy steels successfully to such close limits, and the added ability to multiply the tonnage many times under the necessities of war, come as a result of having developed the *original* technique. The accumulated knowledge and experience of the mill technicians and men who developed an idea into a special steel, and shouldered the trials of pioneering it commercially, make all the difference.

For Allegheny Ludlum, that is true in the cases of stainless steel, gasoline engine valve steel, and many alloys for electrical purposes. It is true also of certain tool and die steels, notably the DBL High Speed Steel analysis, which has replaced "18-4-1" on the majority of the nation's production jobs.

These steels of our development are among the most vital of the war. We want to place our "know-how" completely at your disposal, to help you select them wisely and use them well, without waste. ● Call on us for technical and fabricating data, or for the help of our Technical Staff.

ADDRESS DEPT. FI-3

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

A-8825 . . . W & L

The trend of modern machinery design is towards greater use of built-in rolled shell shaftless type electric motors.

Direct motor drive of different operating parts of a machine permits the application of motors with exactly the proper electrical characteristics for each drive. This eliminates costly and complicated mechanical transmission of power from one part of the machine to another.

A wide range of electrical characteristics and dimensions for each horsepower rating—permits a greater flexibility in designing machinery.

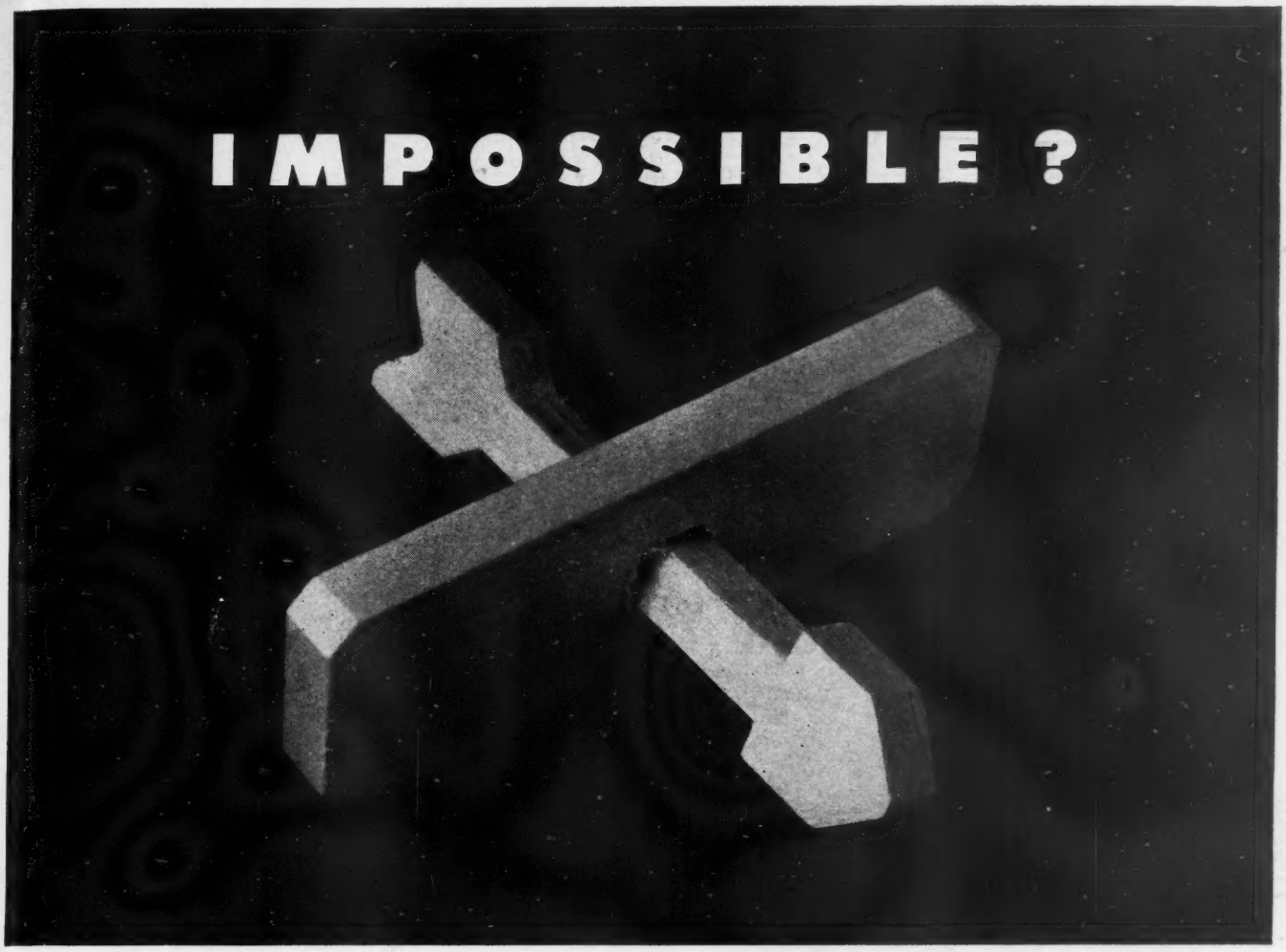
For over 40 years we have been working hand in hand with machinery designers—helping to make good machinery better—by the proper application of the proper motors.

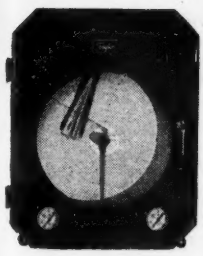
We earnestly solicit your inquiry on your very next electric motor requirement—and assure you that your needs will receive our most prompt and careful attention in every way.

A copy of our Bulletin No. 516C, describing shaftless motors and their application will be cheerfully sent upon your request.

THE LOUIS ALLIS CO., MILWAUKEE, WIS.

IMPOSSIBLE?





OF course it's impossible. Nobody but a gremlin could have put the arrow through that block of wood, because the ends are bigger than the hole. But there it is, an accomplished fact—and there's a perfectly simple explanation for it.

A few years ago it was considered impossible to put glass packages through a retort without tremendous breakage and loss. But today the Taylor 2A Retort Control System for glass package processing has made glass as nearly foolproof as tin.

We're proud of the 2-A System, which is now helping to set at rest the fears of many canners going into glass retorting for the first time. But we're equally proud of other "impossible" jobs which Taylor "know-how" has been able to work out. Such as Taylor Accuratus Tubing for mercury-actuated thermometers, which gives you accurate reading with long lengths of tubing regardless of ambient temperature variations. Or the Taylor Thermospeed Separable Well Tube Systems. Precision Valve Action which originated in our Dubl-Response Control Unit. Or the Taylor Fulscope Controller and its recent development, the Taylor Fulscope Time Schedule Controller. Or the Taylor Flex-O-Timer. And last but not least, the new Taylor Aneroid (mercuryless) Manometer for flow and liquid level.

If you have a tough problem, we'd like to try to solve it for you in a hurry. As they say in the war plants these days, if it's impossible it may take a little longer. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording, and controlling temperature, pressure, humidity, flow, and liquid level.*

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

★ KEEP ON BUYING U. S. WAR BONDS AND STAMPS ★

What the well-dressed lima bean will wear!
Snider's
PLEASE NOTE DIRECTIONS ON BOTTOM OF CARTON
Do not attempt to refreeze this product after it has been thawed

• *Snider cartons, made by Container Corporation, combine a special lining with a treated carton stock — so smooth a surface that color photograph of contents is beautifully reproduced!*

YOUR quick-frozen vegetables — or fruits or meats or what-have-you — need "made-to-measure" packaging. There are no successful "standard" packages for quick-frozen foods.

The nature of the product, freezing method, shipping, distribution and merchandising factors all help determine what the package should be. But there *are* rules to follow in determining the *one correct package* for the job. Our frozen foods staff has learned them, and can help you apply them to your line. Call or write the nearest Container Corporation office and arrange a meeting.

CONTAINER CORPORATION OF AMERICA

Chicago • New York • Rochester • Natick, Mass. • Philadelphia • Akron • Cincinnati • Cleveland
Circleville • Detroit • Indianapolis • Wabash • Carthage • Anderson, Ind. • Peoria
Rock Island • Minneapolis • Baltimore • St. Louis • Fernandina • Dallas • Ft. Worth

EVERYTHING PAPERBOARD FOR EVERYTHING PACKED

FOLDING CARTONS • BOXBOARDS • CORRUGATED AND SOLID-FIBRE SHIPPING CASES

"I see everything peaceful and cool ...for five years!"

There probably never was a time when looking ahead and planning were more difficult. But so far as your refrigeration plant is concerned, you *can* look ahead, you *can* plan ahead . . . for as long as five years.

Under the protection of the York Maintenance Contract, you can actually *budget* refrigeration expenses as well as assuring continuous operation, and efficient operation that saves money in power and water costs the day this service starts.

You are protected, too, on replacement parts, on valves, fittings, belts, motors, refrigerant and insulating materials. For a modest flat fee per month, you receive complete, scientific engineering service that is priceless where refrigeration is vital. The coupon below will bring you complete information. Why not send it in today?

York Ice Machinery Corporation, York, Penna.

YORK REFRIGERATION AND AIR CONDITIONING FOR WAR

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

york refrigeration air conditioning *Certified* MAINTENANCE

YORK ICE MACHINERY CORP., YORK, PENNA. FI-6

I am interested in learning more about the York Certified Maintenance Contract.

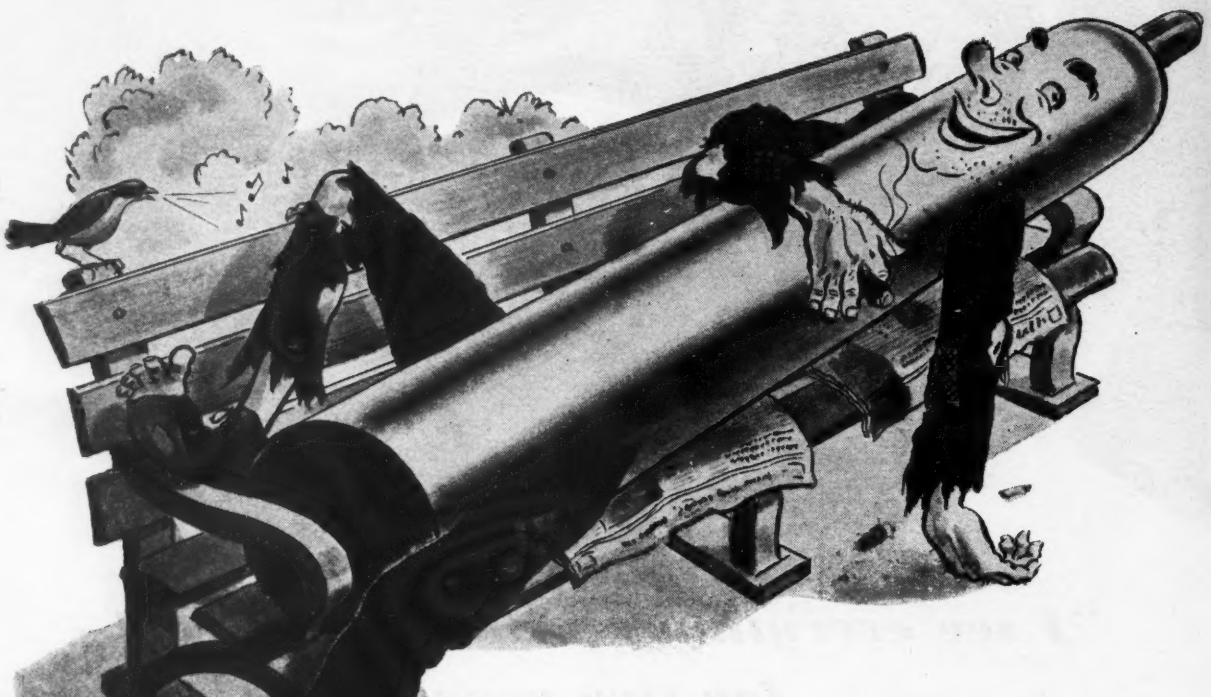
Name_____ Position_____

Co. Name_____

Street & No._____

City_____ State_____

YES SIR, I'M A BUM!



Oh, yes! I've got great possibilities.

With my help, parts for planes could be made quicker, better... temperatures could be precisely controlled for greater comfort and efficiency of war workers . . . vital food preserved . . . lives even, could be saved with the blood plasma I could help refrigerate . . .

But I'm not doin' nuthin. I'm just lyin' around. Just an "empty" cylinder . . . waitin' to rust.

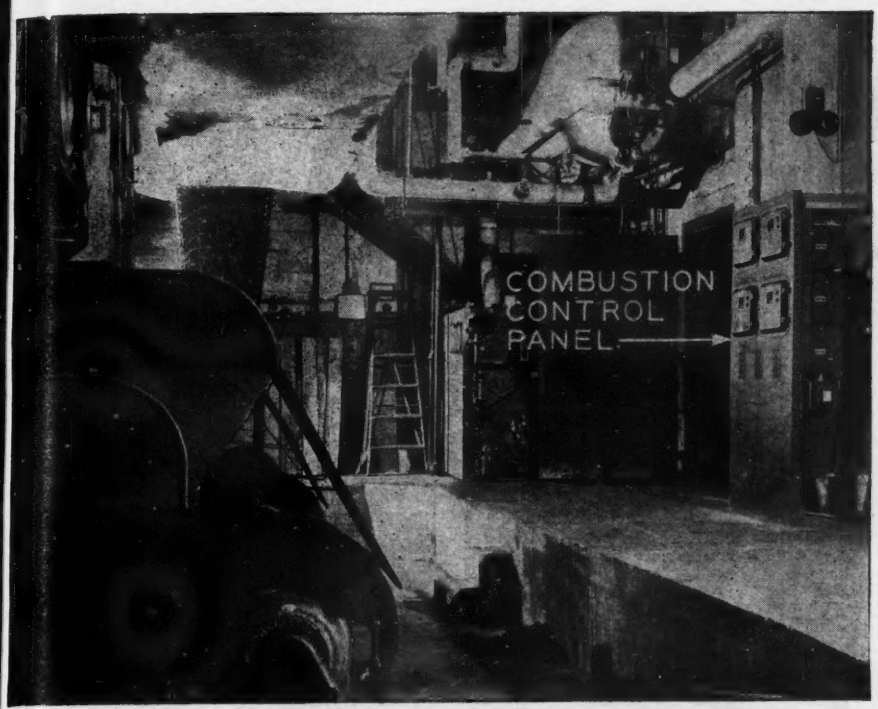
So what? *

THE IDLE "FREON" CYLINDER

This is waste. No one approves of it. Least of all, those in the industry whose business life depends upon the use and sale of "Freon" refrigerants. Ferret out all unused cylinders. Give no storage room to empties. Ship idlers back for important war work to: Kinetic Chemicals, Inc., at Carney's Point, N. J.

KINETIC CHEMICALS, INC., *MAKERS OF "FREON" SAFE REFRIGERANTS*

"Freon" is Kinetic's registered trade mark for its fluorine refrigerants



L&N Type P Combustion Control installed on three 150 hp horizontal marine type stoker fired boilers. Panel is at right; note its compact arrangement, with the single Master Controller, three Furnace Pressure Controllers, and all Control Stations mounted on panel front. A typical easy-to-install Drive Unit, for uptake damper, is partically shown at left.

SOMETHING NEW
FOR PROCESS STEAM POWER PLANTS

The new L&N Type P Combustion Control is a dependable, sensitive equipment ideal for application to boiler furnaces in the food industry. It combines the flexibility of central-station type control with the same basically simple L&N Control so widely used on industrial furnaces. The use of standard industry-proved control units minimizes the cost and makes the equipment ideal for small plants where a centralized, completely electric control is needed. Some of its features are:

A Catalog, now in preparation, will be sent when ready to all who request it. In the meantime, those who want information at once, in connection with a war-production need, will be given specific facts promptly if they will outline their problems.

Jrl Ad N-01P-163(1b)

Simple; Completely Electric. The feeding of both fuel and air to all boilers is regulated in response to a single Master Controller. This Controller is entirely electrical, and moves the dampers, valves and levers of the fuel-air system by means of electric-motored drive units. The only connection between drive unit and control panel is a single electrical conduit.

Low Cost of Installing. Elimination of compressors, piping and line shafting cuts the labor and time of installing; our factory-assembly of the control panel further reduces installation costs. We can, if desired, supply panel on either individual boiler or group panels. Frequently a boiler board, including both control and instruments, provides a most economical arrangement.

Flexible and Centralized. Without moving from the control panel, the operator can switch from fully-automatic control to base-load control or to push-button control; can operate some boilers on automatic control and some on push-button; can change fuel-air ratio of any boiler or boilers. In brief, he can suit the operation to the plant requirements.

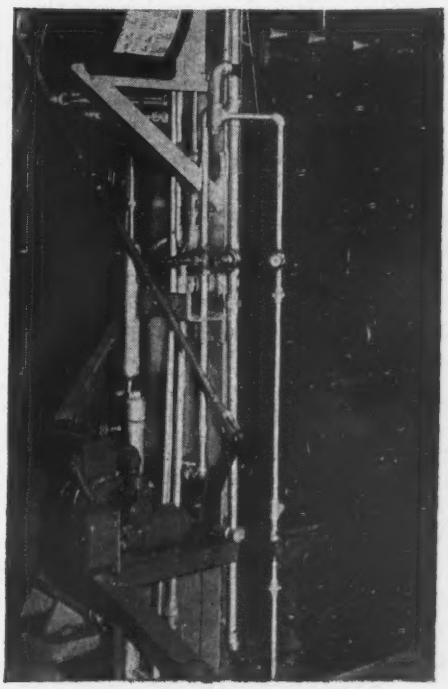
Reliable. Control requires only electric power for its operation; which power can come either from 110-volt a-c lighting circuit, or from same circuit which supplies other boiler auxiliaries.

Furthermore, whether on automatic or remote push-button control, the motorized gear reducers cannot be back-driven by an unbalanced damper or equivalent.

Interlocks and other protective features are available.

depends on me!

A Slogan For All Americans



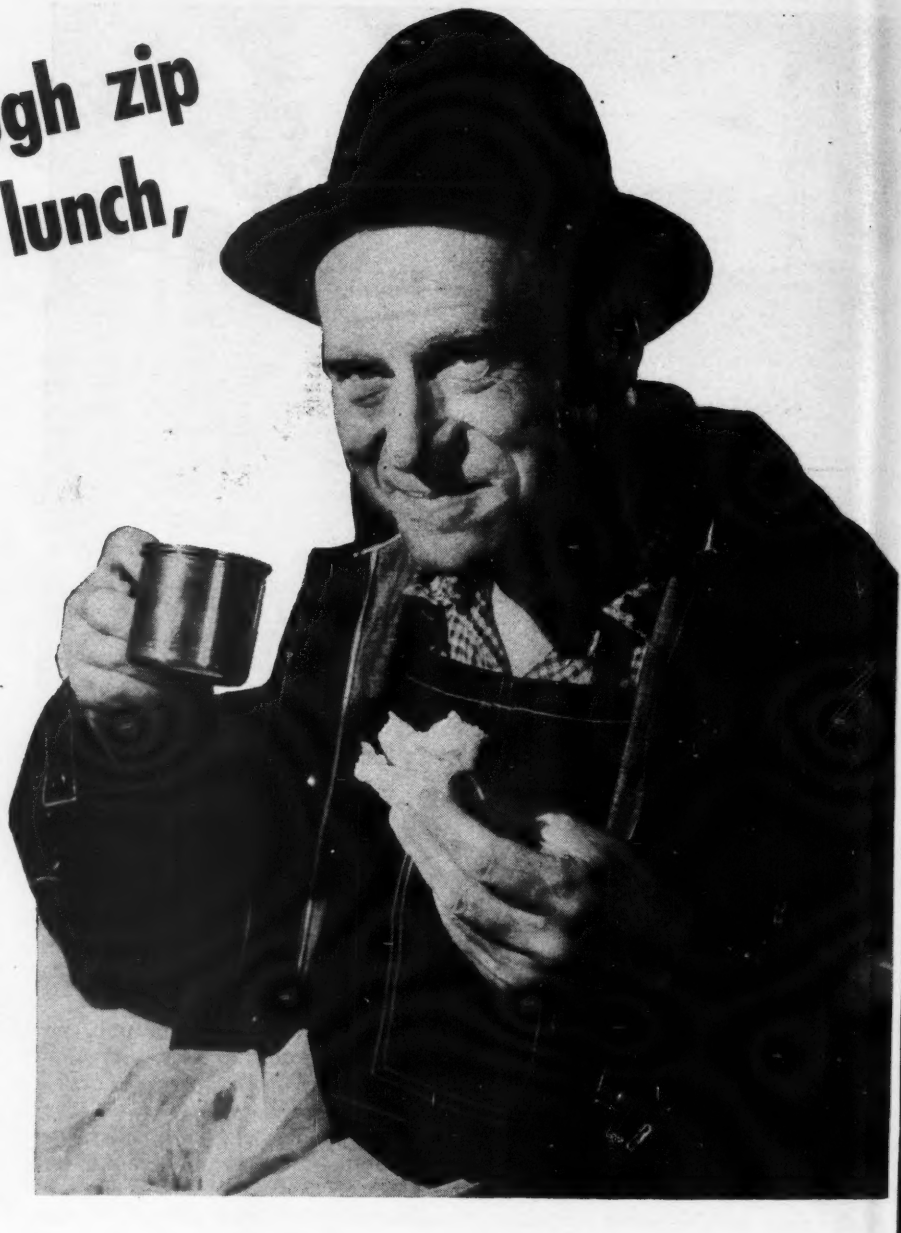
This electrical Drive Unit is linked to the uptake damper in an industrial processor's power plant. A similar unit is employed for each damper, lever or valve; there are no linkages from unit to unit, and the only connection to the Control Panel is by a single electrical conduit.

LEEDS & NORTHRUP COMPANY, 4912 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

Getting enough zip out of your lunch, ol' timer?



HOW'S that cheese-and-ham sandwich the missus fixed for you this morning? Is the bread rich in nutrition and evenly white? Does the cheese have that fresh, snappy flavor? And how about that slice of canned ham—is it spicy and sweet?

That satisfied expression on this war worker's face seems to say, "Never better!" And it's true. In spite of rationing, the men and women in America's factories have never eaten more healthfully than they do today. Credit part of this happy fact to the high manufacturing standards of bakers and food packers, who protect the flavor, nutritive and keeping qualities of their products by using stainless steel equipment in their plants.

How fortunate for America's vital wartime food supply that so many plants producing such essential foods as meat and cheese are equipped with stainless steel. This non-tarnishing, non-toxic miracle metal prevents food spoilage and keeps plant sanitation standards high with minimum labor.

While the war lasts, take good care of the stainless equipment in your plant—and it will see you through. No other metal outwears stainless. You may not be able to purchase additional equipment now, but U·S·S Stainless Steel will be back after the war to help you produce even better food products at lower cost.

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
NATIONAL TUBE COMPANY, *Pittsburgh*
United States Steel Supply Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

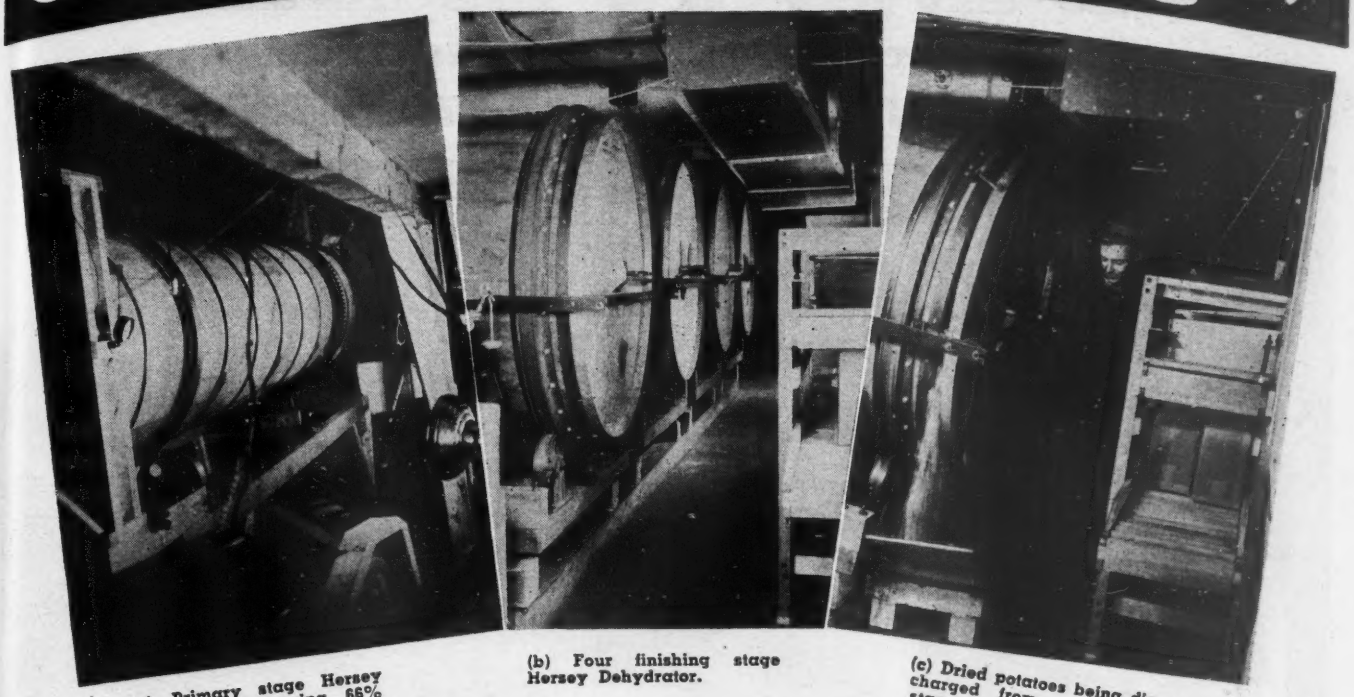
U·S·S STAINLESS STEEL

"Be glad it's Stainless... it lasts longer!"

Sheets · Strip · Plates · Bars · Billets · Pipe · Tubes · Wire · Special Sections

UNITED STATES STEEL

Continuous! Automatic! No Labor!



(a) Primary stage Hersey Dehydrator removing 66% of the moisture.

(b) Four finishing stage Hersey Dehydrator.

(c) Dried potatoes being discharged from a finishing stage Dehydrator.

HERSEY
VEGETABLE DEHYDRATOR

Above photographs show the Hersey in operation in Westfield, Maine

CONTINUOUS IN OPERATION taking the product in continuous flow from the last washer and discharging without further attention to the packaging room

COMPLETELY AUTOMATIC in movement of product, temperature control and cycle time NO OPERATORS NEEDED

UNIFORM TREATMENT because the product is in motion and is being turned over constantly Every particle receives exactly the same treatment

Constructed of

NON-STRATEGIC MATERIALS such as wood, cast iron, etc., wherever possible

• ***Send for Catalog Today***

HERSEY MANUFACTURING CO.

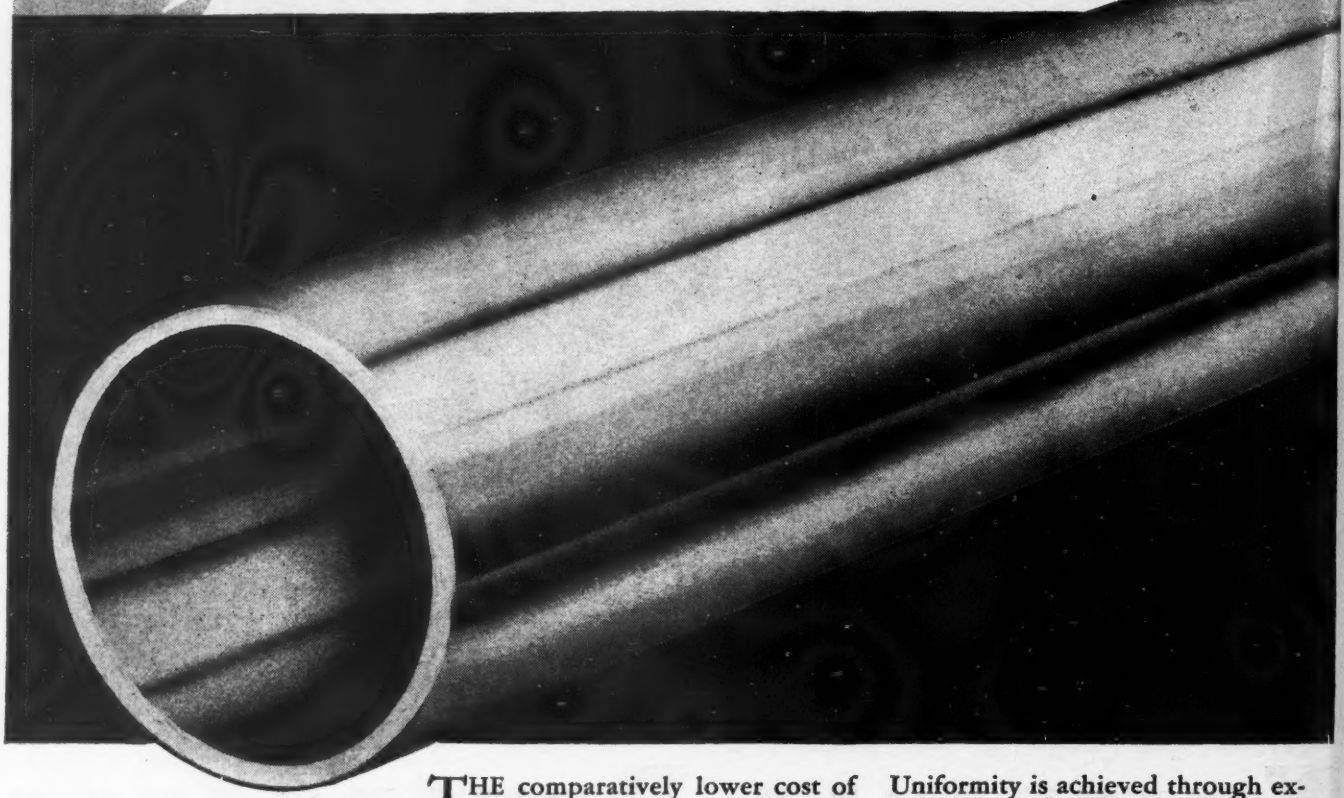
DRYING ENGINEERS FOR MORE THAN 60 YEARS

381 E STREET • SOUTH BOSTON, MASS.

GLOWELD

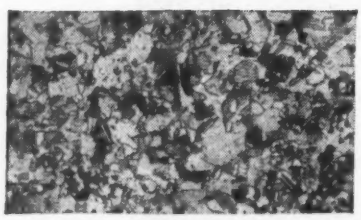
. . . Globe ELECTRIC Welded Stainless Steel Tubing . . .

BROADENS THE USES OF STAINLESS



THE comparatively lower cost of GLOWELD Stainless Steel Tubing and the wide range of diameter and wall thicknesses, suggest many new applications for stainless tubing. Accuracy to size and gauge permits faster fabrication, easier bending, cutting, welding, expanding and flanging. There is no detectable flash at the weld because GLOWELD is produced by a closely controlled process. Uniformity is achieved through exacting control in production processes and by thorough inspection at every step in manufacture.

Where lower cost is a factor and high-grade stainless steel tubes are required, GLOWELD offers an economical and satisfactory solution to the problem . . . perhaps to a problem of yours.



Photomicrograph of weld zone, showing grain structure of weld and parent metal.

★ STAINLESS TUBES
★ BOILER TUBES
★ GLOBEIRON TUBING
★ GLOWELD TUBES

GLOBE TUBES

★ CONDENSER AND HEAT EXCHANGER TUBES
★ MECHANICAL TUBING

GLOBE STEEL *Tubes*

4001

GLOBE STEEL TUBES CO., *Milwaukee, Wisconsin, U.S.A.*

Ambassador for a thousand products

The wholesaler's salesman is the ambassador for yours and 999 other products. This does not permit him to push them all.

Hence, the manufacturer must win retailer support for his own product. In accomplishing this end, Bemis Deltaseal Bags have an outstanding record.

Their colorful brand printing adds eye appeal. Their handy pouring spout wins quick consumer preference. Their square ends make them easy to stack on shelves or in mass displays. Hence, retailers get behind products packed in Bemis Deltaseal Paper Bags.

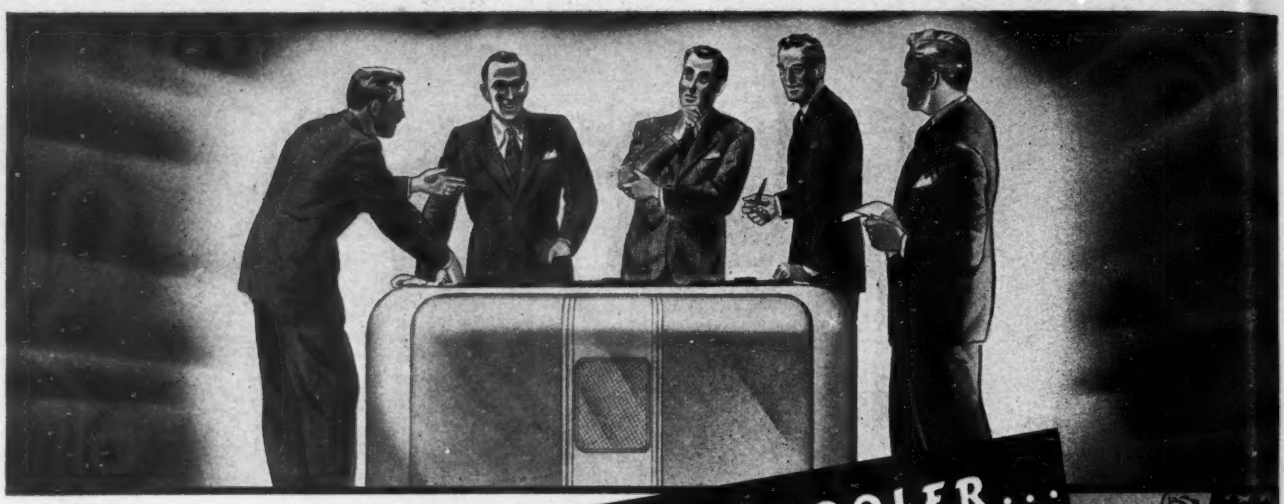
BEMIS BRO. BAG CO.

Headquarters for the

DELTASEAL System of PACKAGING

Minneapolis, Minnesota

OFFICES: Baltimore • Boston • Brooklyn • Buffalo
Charlotte • Chicago • Denver • Detroit • E. Pepperell
Houston • Indianapolis • Kansas City • Los Angeles
Louisville • Memphis • New Orleans • New York City
Norfolk • Oklahoma City • Omaha • Peoria • St. Louis
Salina • Salt Lake City • San Francisco • Seattle • Wichita

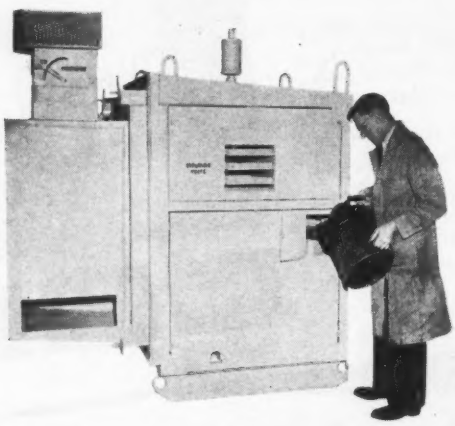


LET'S ASK UNIVERSAL COOLER...

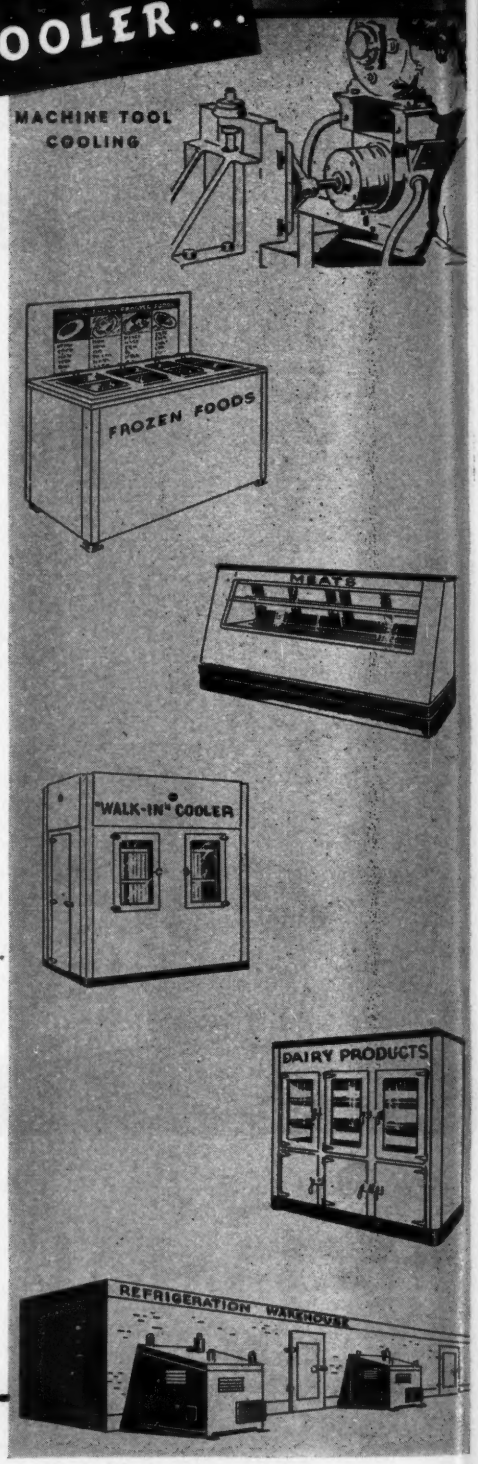
...Today's Developments in Refrigeration

To a military man, today's Universal Cooler developments guarantee protection for foods that become hearty meals. To Universal Cooler workers, present developments call for increased production and new engineering skill and ingenuity for meeting rigid war specifications.

But to a manufacturer of refrigeration equipment, today's Universal Cooler activity forecasts even greater leadership in dependable, automatic refrigerating units after Victory. An expanded, highly trained Universal Cooler research-engineering staff even now concentrates on further innovations. So we suggest that, when your planning reaches the point where you discuss the cold-making mechanism, you "consult Universal Cooler."



Typical Universal Cooler Refrigerating Unit specially-constructed for U. S. Army prefabricated cold storage warehouses, temporary and permanent bases, cantonments and mobile units.



UNIVERSAL COOLER

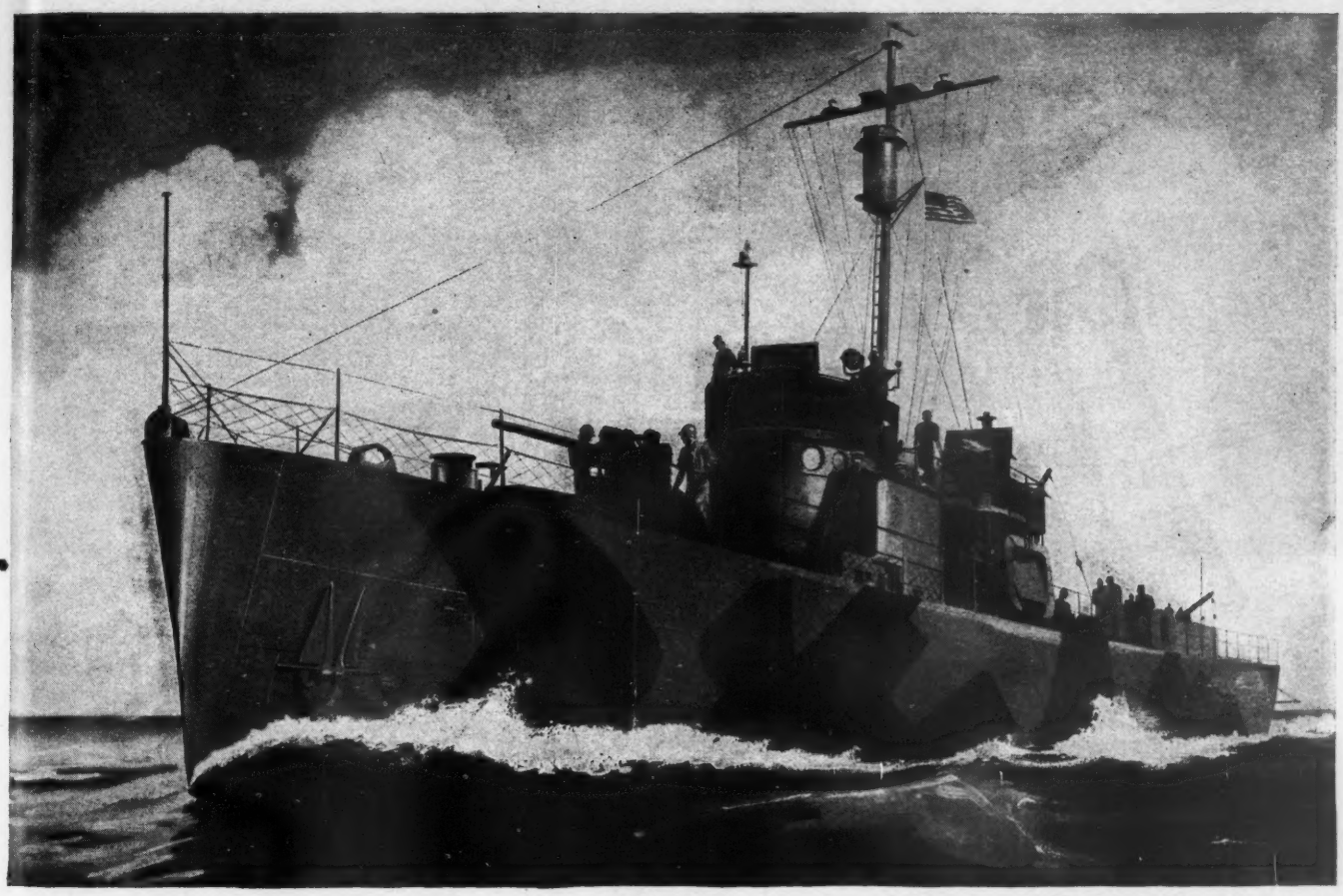
WE SELL TO MANUFACTURERS ONLY

UNIVERSAL COOLER CORPORATION • *Automatic Refrigeration since 1922*

MARION, OHIO • BRANTFORD, ONTARIO

WHAT!

FLUID DRIVE A PC BOAT?



One of the U. S. Navy's new fluid drive equipped PC boats seeks out enemy subs.

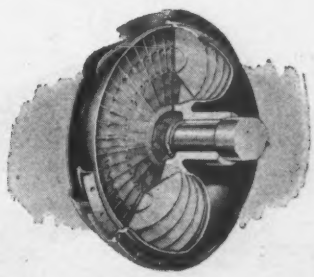
SOMEWHERE AT SEA this minute — now, U. S. Navy PC boats are relentlessly hunting down enemy subs.

Laden with depth charges and carrying an additional armament of torpedoes and anti-aircraft guns and cannon, they knife swiftly, silently through dangerous waters.

American Blower Fluid Drives on these new PC boats (as well as on many other types of Navy craft) prevent transmission of torsional vibrations and shock from powerful Diesels to delicate machinery, synchronize multiple engine speeds and permit rapid clutching and declutching.

Building equipment to Fluid Drive warships, submarines and cargo vessels is among the important assignments for *victory* entrusted to American Blower.

After Victory the engineering skill and experience and American Blower's complete facilities for manufacturing, fabricating, welding, processing and assembling will be available to produce for you Fluid Drives, air handling equipment of all types and other ingenious products which will play a vital role in post-war world progress.



Cutaway view of American Blower Fluid Drive. Note: there is no mechanical connection between driving and driven members.

ARMY (E) NAVY
For excellence in production.

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator and Standard Sanitary Corporation

AMERICAN BLOWER — MECH DRAFT · AIR CONDITIONING · FLUID DRIVES · DUST COLLECTORS

Your NEW Package Needn't Be a Stranger!

When material restrictions make it necessary for you to change from the old, familiar package to a wartime successor, your first consideration is to make sure the new container is functional. That's as it should be.

However, your wartime package should not be a stranger—and it needn't be. You can easily retain most of the recognition features and thereby preserve your brand identity. Even though the materials, style and shape of the new container are different, you can achieve the same quality appeal as heretofore by continuing to use *your established colors* . . . by retaining your familiar brand name and trade-mark design.

Our staff of experts is ready and eager to serve you. As one of the world's largest producers of packaging and high-quality lithographed materials, we invite you to make use of our facilities. Consult with us on your packaging problems . . . perhaps we can help you as we have helped so many others.

And, incidentally, as pioneers in Full Color Lithography and leaders in the field for over three-quarters-of-a-century, we can assure you of real savings in Full Color packaging materials. Write us today.

For over 75 years—headquarters for high-quality, colorful, lithographed labels, box wraps, packets, folding boxes, cartons, merchandise cards and envelopes, displays and advertising materials.

FREE!
Our 28-page book —"The Value and Patriotic Use of Full Color" tells how to get beautiful results at low cost. Write today for your *free* copy

Contractors to the Government—War Work Comes First!

STECHER-TRAUNG
LITHOGRAPH CORPORATION
Rochester, N. Y. **San Francisco, Calif.**
Offices in Principal Cities

PASS THE *Ammunition*

Processed foods in tonnages running into the millions must be provided for our fighting men and our allies. Your job, and ours, is to help keep these supplies moving.

Cutting and mixing are important steps in the preparation of meat and other products . . . and Hottmann equipment can be made available for *approved* new plant facilities.

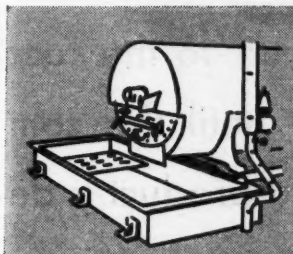
We are prepared to consult with you, make recommendations, aid you in obtaining Hottmann equipment for war production purposes.

About Tomorrow's Problems

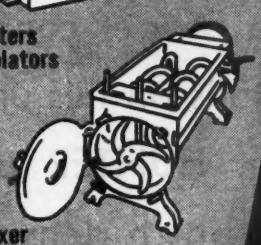
New problems in manufacture and improved methods in processing are certain in an America obligated to feed more millions of people than ever before in the post-war years. Let us help you plan, now, to work out tomorrow's mixing problems.

Put Your Mixing Problems up to

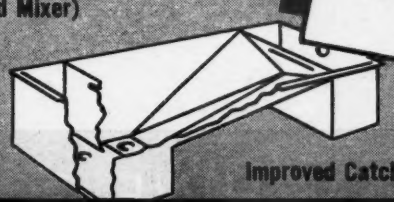
HOTTMANN



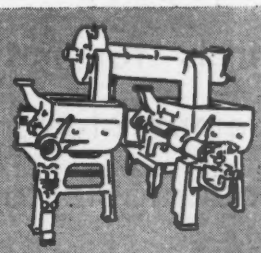
Fat Melters and Percolators



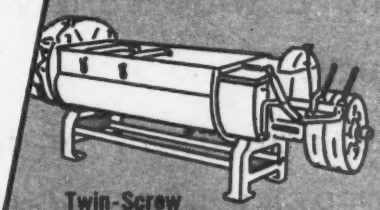
Kutmixer (Combined Cutter and Mixer)



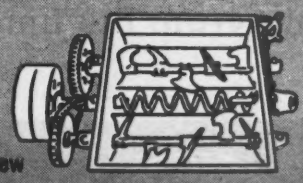
Improved Catch Basin



Yeast Machinery



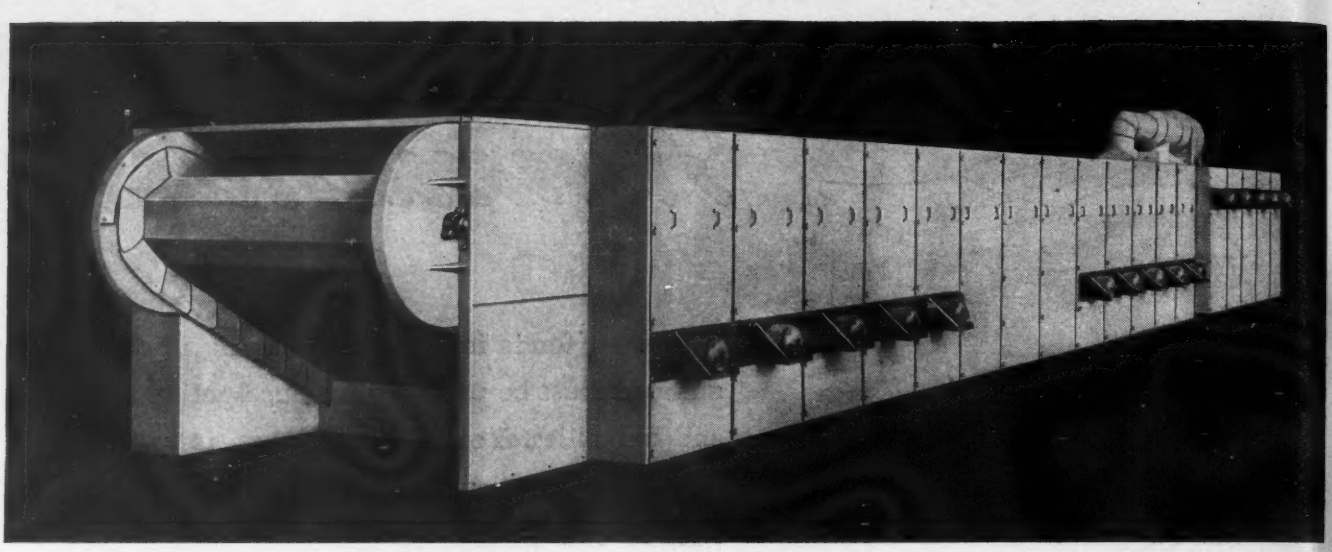
Twin-Screw Super Mixer



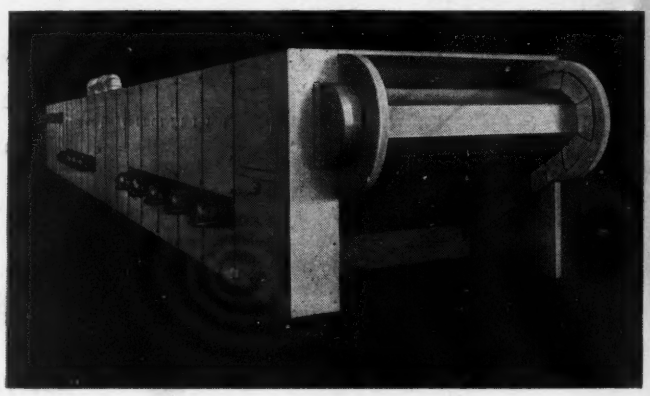
Mixer, Interior view

THE HOTTMANN MACHINE COMPANY

3325-47 East Allen Street • Philadelphia, Penna.



FOR *Continuous,* UNIFORM VEGETABLE DEHYDRATION SPECIFY HUNTER

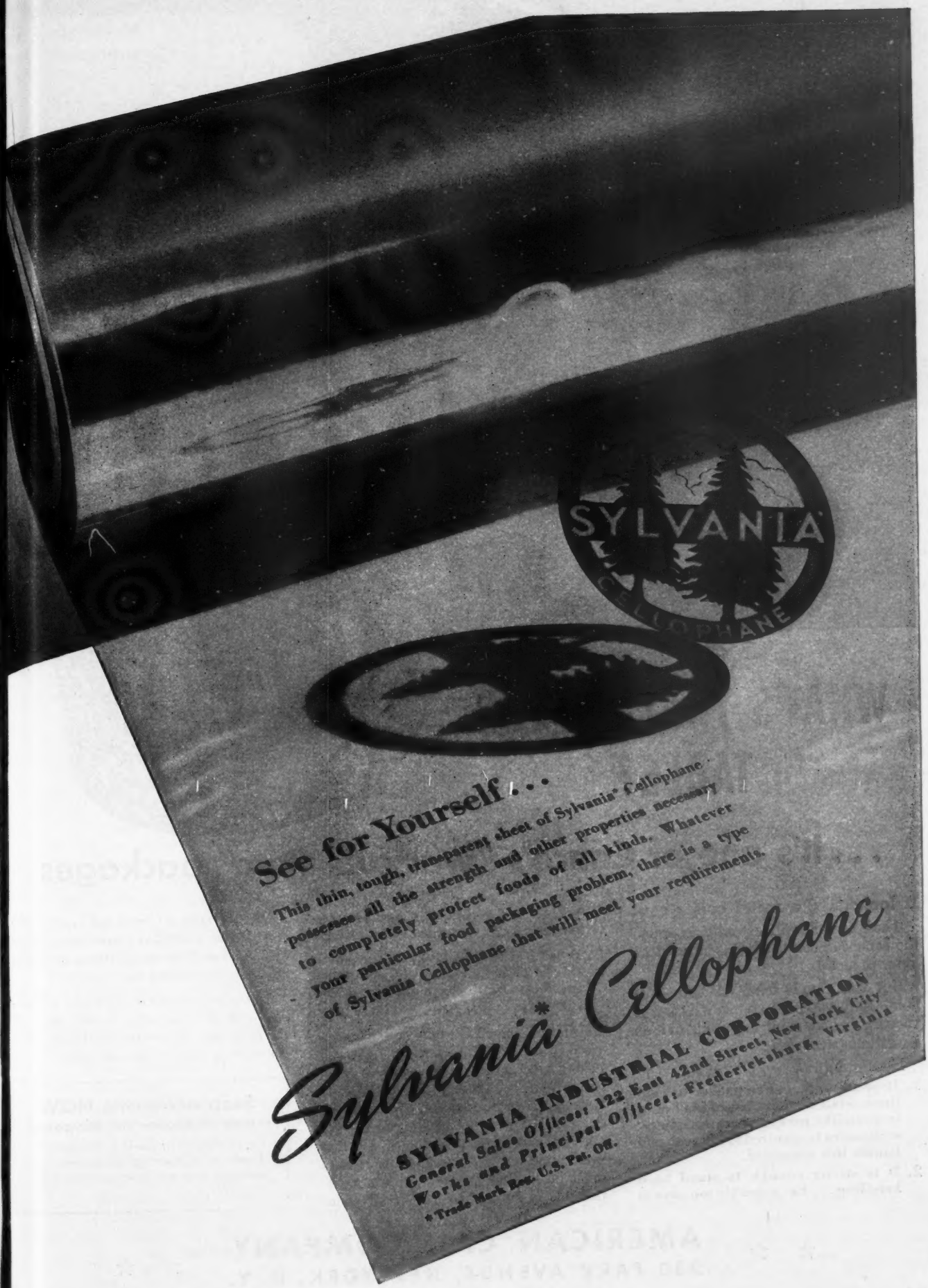


Pictured on this page is the new HUNTER Continuous Food Dehydrator. It comes completely equipped with all necessary controls for maintaining necessary temperatures and humidity. It is adaptable to continuously dehydrating a wide variety of food products.

The operation of this new HUNTER unit is completely automatic from the time the blanched product is delivered to the feed end of the dryer until the completely dehydrated product is delivered to the proper containers.

For full details on this unit and other modern HUNTER aids to continuous or batch dehydration write to

JAMES HUNTER MACHINE CO.
NORTH ADAMS, MASSACHUSETTS
FOUNDED 1847


SYLVANIA
CELLOPHANE
See for Yourself . . .
This thin, tough, transparent sheet of Sylvania* Cellophane possesses all the strength and other properties necessary to completely protect foods of all kinds. Whatever your particular food packaging problem, there is a type of Sylvania Cellophane that will meet your requirements.
Sylvania* Cellophane
SYLVANIA INDUSTRIAL CORPORATION
General Sales Offices: 122 East 42nd Street, New York City
Works and Principal Offices: Fredericksburg, Virginia
*Trade Mark Reg. U.S. Pat. Off.

WHAT'S THAT ON THE TABLE?

. . . It's one of Canco's "war substitute" packages

It looks like a metal coffee can.

The housewife will instantly recognize the same familiar package she used to know in metal.

But this can is made of fibre—all-fibre. And, while of course it is not a vacuum can, we're mighty proud of it as a wartime package.

Here's why . . .

1. **It permits the coffee packer to continue retail distribution of his brand in a can-like package because no new equipment is required to fill, seal, and handle this container.**
2. **It is strong enough to stand hard handling . . . has a double top, one to protect it for shipping, one as a reclosure. *And*, it has a protective lining!**
3. **It can be lithographed with the packer's familiar label, thereby maintaining his brand name and package identity.**

This is only one of the many answers devised by Canco technicians and research men in meeting today's packaging problems. Some of these problems are extremely difficult, as you well realize. Some of them cannot be met, because of material shortages. (For the time being, production of these coffee containers must be limited. Materials are not obtainable in sufficient quantities to convert more than a few of our many coffee lines.) But wherever Canco can use its technical skill for adaptations or substitutions—it is doing so.

This work, of course, must and will proceed without interfering in any way with the large and important contributions we are making daily to the war effort.

Stop accidents NOW
—save Manpower for Warpower

Co-operate with the War Production Fund to Conserve Manpower by warning your employees not to take chances.

☆ ☆ **AMERICAN CAN COMPANY** ☆ ☆
230 PARK AVENUE, NEW YORK, N. Y.

Electrical Equipment—Weapons and Tools

From miniature motors to mammoth generators, from tiny detector tubes to great broadcasting stations—everything electrical is essential to our war effort

As this editorial goes to press, newspapers and radio news commentators are telling the dramatic story of the blasting of two mighty Nazi power dams. Floods are sweeping down the Ruhr Valley, Germany's most vital munition production center. Two vast networks of industrial activity lie inert, for the great generators that had fed power to hundreds of plants producing war goods for Hitler, today stand idle. This daring raid will go down in history as one of the most, if not *the* most devastating of the entire war. It has destroyed two great sources of power, stopping the wheels in hundreds of plants and throwing into darkness thousands of factories and homes.

This epoch-making raid by the R.A.F. brings home to us the vital importance of our own power resources, those colossal generators from which flows the current that turns the wheels of our great industries, illuminates our factories and homes and runs our electric railways and subways. It makes us realize how dependent we are on electricity and how important is the part of those manufacturers who produce the electrical equipment that makes possible its generation and use.

Beginning with Thomas A. Edison, the inventive genius of electrical manufacturing men has devised more and more efficient ways of generating the current, better and better means of transmitting it and of applying it to do thousands of jobs quicker and better.

The products of electrical manufacturers have become so completely an essential component part of every industrial, business and domestic activity that our economy and our war effort could not go on without it.

In days of peace the laboratories of our electrical industry gave us radio, fluorescent lighting, infra-red drying, precision process-control, telemetering, split-second circuit breakers and many other things that border on the miraculous.

Today their facilities and their genius are devoted to an all-out war of wits with Axis scientists and production men.

Electricity plays a significant part in this war . . . from the "walkie-talkie" that brings support to hard-pressed outposts, to the mammoth motors on the battleships. While many electrical developments today are cloaked in secrecy, the nation will enthusiastically applaud these electrical manufacturers when the curtain is lifted.

The far-reaching importance of electrical instruments, apparatus and machines becomes evident when we consider that over 350 different electrical items go into combat vessels and that more than 170 go into a fighter plane. Most of these products are distinctly special in nature and are far removed from their civilian counterparts if, indeed, they have such counterparts.

To the civilian, a light bulb is something so standardized that every need can be filled by any nearby dealer. Our armed forces, by contrast, must have at their disposal more than 400 distinct types of lamps. Some no larger than the head of a match, are so brilliant that they flash signals under a tropical noon sky. Others are built to withstand extremely low temperatures, vibration, shock and many other abuses to which they are subjected.

On planes, for example, numerous fractional-horsepower motors are used but the standard industrial motor is not suitable for this service. New records in low weight-per-horsepower had to be achieved involving extensive changes in design and production.

To prevent the light from instrument panels from impairing the vision of night fighters, ultra-violet radiation which activates fluorescent instrument dials was developed. As a result, the pilot may look out into the darkness after reading his instruments without the least effect on his eyes. How many precious air victories can be credited to this one development alone?

But, in general, the story of this industry's war work is much too blurred by military censorship to afford an adequate picture of its contributions. The factories and shipyards that are turning out war matériel tell a more complete story. Many of these have been built during the past two years. Others have gone through a complete conversion process. In every case, large quantities of electrical materials were involved.

In the broadest sense, there are three major jobs which this industry has had to do, in addition to equipping our modern war machine. It has had to supply materials for the vast expansion of our industrial system, keep every plant fully maintained, and provide the necessary equipment for the vital power and communication fields.

More than $1,900,000,000 was spent for new industrial construction in 1942, and of this about 7% or $140,000,000 was for electrical materials. New machine tools and other production equipment required an additional $350,000,000 worth of electrical products. The conversion program called for another $145,000,000 of electrical apparatus and supplies.

This total of over $600,000,000 in itself would have staggered the electrical industry in a peace-time year. Yet, this record-breaking production was essential and had to be superimposed upon the direct requirements of the Army and Navy.

Industry depends upon electricity. Consider for a moment the effect of modern lighting upon war production. Industry enjoys levels of illumination and color quality that were undreamed of ten years ago. As a result, midnight shifts operate at daytime efficiency. As a matter of fact, many of the more modern plants have no windows at all.

Then there is maintenance. The failure of one single motor or feeder will stop a production line. Electrical manufacturers have had to stand at all times ready to

supply the heavy demand for the maintenance and repair parts that keep our industrial machine operating at top speed. Excess loads, 24-hour schedules and inexperienced production hands combine to shorten the lives of electrical equipment.

Electrical manufacturers have had to supply the greatly expanded needs of our power and communication systems.

New construction of all sorts — war plants, cantonments, war housing — has created a formidable need for additional capacity. Every element in our domestic economy has called for increased communication and power services. All this had to be superimposed upon the vast demands of our armed forces. The magnitude of this task is obvious but it is being successfully accomplished. Every old installation is functioning smoothly and every new one has been ready to function on exact schedule. There has been no failure either in our power or in our communication. Part of the credit for this performance belongs to the hundreds of manufacturers who delivered their products when and where they were needed.

This was not merely a problem of increasing production. These manufacturers had been depending on rubber, copper, aluminum and steel — all highly critical materials. For much of their non-military production they suddenly had either to find substitutes or practice the utmost economy and ingenuity.

Solutions to many problems were quickly found. Lighting manufacturers greatly reduced their use of steel by designing efficient, non-metallic reflectors. Wire and cable manufacturers expanded their use of synthetic insulation in place of rubber and they promoted the use of higher distribution voltages so that every ounce of copper would work more efficiently.

Steel is essential in apparatus that operates magnetically. There is no known substitute. But marked economies in its use have been achieved through the development of new alloys that are of increased magnetic efficiency. As a result, motors and transformers now consume substantially less steel than did units of equal capacity a year or two ago.

Electrical manufacturers have given our industries numerous new production tools. Infra-red heating tunnels, for example, have drastically reduced the time involved in production drying . . . in some cases from hours to minutes. High-frequency induction-heating has been spectacularly successful in the forging, brazing, hardening and casting of ordnance. Modern welding equipment makes possible speedy production with inexperienced labor.

America's production lines are being patrolled by electrical devices which eliminate human error. One million volt X-ray equipment looks through castings and points an unfailing finger at defects. An electronic flaw detector tests nonferrous drawn-metal tubing for imperfections. Other electronic devices are counting and sorting the products of thousands of war plants. Precision controls regulate all sorts of processes, from aluminum production to armor plate annealing.

These are but a few of many examples of the way in which the magic power of electricity has been harnessed to the war effort. Back of every development there is at least one electrical manufacturer — more often many — who have pooled ideas and methods with no thought of royalties or dispute over cost allocation.

No story of the electrical industry would be complete that did not pay tribute to those manufacturers who have dropped their normal lines in order to produce special war products. Many appliance manufacturers fall in this group. When war came, they did not stop to argue that civilian morale and big pay checks would demand a continued supply of their products, instead they quickly shifted to the production of war matériel and today they are deep in the manufacture of machine gun parts, aircraft sub-assemblies, and even gas-mask fabric. They have had to abandon their hard-won markets for the duration; but they are contributing mightily to permanent peace and a more prosperous world to which they will return when the guns are silenced.

This great industry has increased its production threefold in two years — $2,500,000,000 in 1940 to $7,500,000,000 in 1942. It has done this with all the zest of youth, for this is a young and a pioneering industry. Few companies in this industry are fifty years old; the majority are much younger. Top management in general is young, too, and many outstanding technical developments have come from the brains of men just a few years out of college.

The results of all its intensive intelligent work can be found in every factory, on every battlefield and ocean, and even in the flak-spotted air over Berlin. In a sense, the electrical manufacturing industry stands beside every soldier and every sailor as he goes into action. It has a place of honor it richly deserves.

And when this war passes into history, as it surely will, our soldiers and sailors returning to peace-time jobs, will find a life greatly enriched by electrical developments that were undreamed of yesterday.

This is the twelfth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

LAURENCE V. BURTON, Editor JUNE, 1943

You Can't Eat Indexes

"YOU may wish to get your facts straight," wrote an official in Washington in a "straight-from-the-shoulder" comment on certain statements regarding the food outlook. His rebuttal cites the following table which he compiled from "*Agricultural Statistics, 1942.*" His table is quoted verbatim.

TABLE I—Index Numbers of the Volume of Agricultural Production.
(1935–39 = 100)

	First World War 1913–1918	Second World War 1938–1943
Year preceding war	81	103
First war year	86	106
Second war year	86	110
Third war year	83	113
Fourth war year	86	127
Fifth war year	90	128[1]

[1] Estimate for 1943 based on average yield on acreages reported in Farmers Intentions to Plant. For food products alone the 1943 estimate is 131.

At first glance, such a table as the foregoing is very impressive indeed. But, after study, the apparently larger food production of the present war is not so significant. Furthermore, there is the little matter of comparing farmers' *intentions* to plant with actual *performance*. It would be more logical to compare 1943 intentions with the intentions to plant in the previous years, for it is a fact that farmers intentions go awry, just as all human endeavors fail to measure quite up to intentions. Therefore the intention figure should be discounted by perhaps about 10 percent to reach an index number that reflects anything like probability. Yet this does not even consider the unpredictable weather influence. Both, however, are a secondary matter compared to the overoptimistic, rosy picture that is implied in these index figures of the Second World War.

There is no disposition to quarrel with index numbers if they are used to reveal the truth. After all, an index is merely an easy way to reveal a trend, an index number being easier to recall than an actual tonnage figure, usually in the billions. In arriving at an index, the procedure is to select some base which is called 100. In this instance the base is the average agricultural production in the years 1935 to 1939. Production in the other years is expressed as percentages of the base period.

The apparent conclusion to be drawn from the index numbers is that we have an abundant agricultural production. We can disregard the fact that the index includes cotton, tobacco, hemp, flax, broom corn, hides and other inedibles, however useful they may be, in addition to the food crops. That there is no such bounteous supply of food as the Second World War index figures imply is known to anyone who has ever tried to make the family ration books cover the food needs of his family or who has tried to buy many of the more common unrationed foods like potatoes.

In making this statement there is no charge that anyone is going hungry, yet. But you can't eat indexes. And even these indexes lead to a false conclusion. The difficulty is that production must be divided by the number of people to share that production before it gives any indication of the amount presumably available to each person. If the production index is reduced to a per capita basis, it is more indicative of the truth than to state the fact that 1942 agricultural production is 27 percent above the base period. Facts can be very misleading. Fact and truth are not synonymous. It can be a fact that in January the temperature in New York was 72 deg. F. for most of one day. But that does not lead to a truthful conclusion that winter is as warm as summer.

Facts can be lies as far as the whole truth is concerned. When M. Clifford Townsend, head of the Agricultural Production Administration, broadcast these index figures on May 2 to defend the current food outlook, he was not telling the whole truth. He was citing facts, but failed to interpret these facts. This failure may have left many a person with an uneasy feeling that the pessimists are not on sure ground, yet if the optimists are correct, why is it nearly impossible to buy potatoes and why is food rationing necessary?

By reducing the index figures of total production to index figures of percapita production a wholly different picture emerges. You will find this done in Table II.

Just why the statisticians and economists of the Department of Agriculture should make such a point of the size of the production index and omit to state that we have a rapidly growing population that needs more and more food must be left to the politicians to answer.

But we must give the Department of Agriculture full credit where credit is due. On the per capita basis during the fourth year of the Second World War the showing is impressive, being 94 compared to 84.6 of the corresponding year of the First World War. That is very good indeed. Even third-year comparisons are slightly favorable to the current war (84.5 compared to 82.2). But

TABLE II—Correction of Production Index to Per Capita Basis.

	First World War				Second World War			
	Year	Population, millions	Index Nos., volume of agricultural production	Modified Index Nos., agricultural production per capita	Year	Population, millions	Index Nos., volume of agricultural production	Modified Index Nos., agricultural production per capita
Base Period (1935–1939=100)			100	79.7			100	79.7
Year preceding war.	1913	96.1	81	84.3	1938	127	103	81
1st war year.....	1914	97.4	86	88.3	1939	129	106	82
2nd war year.....	1915	98.8	86	87.0	1940	131.6	110	83.7
3rd war year.....	1916	100.2	83	82.2	1941	133.7	113	84.5
4th war year.....	1917	101.5	86	84.6	1942	135.6	127	94
5th war year.....	1918	102.9	90	87.3	1943	137.5	128*	93.1*

* Estimate based on farmers' intentions to plant.

first- and second-war-year per capita index figures are greater in the first war than in the second.

Farmers intentions for 1943 are indexed at 128 by USDA, which on a per capita basis is only 93.1. And then if we discount this by the expected abandonment of acreage, sometimes as high as 10 percent, the 93.1 figure must be shaded materially. If it were reduced by a full 10 percent it would be at about 84. In view of our Lend-Lease and military obligations, 84 would be alarming, even 93.1 is none too happy.

You can take the government's own figures and draw your own conclusion. In fact, everyone ought to study the table and do a bit of calculating on his own. In the first year before each war the per capita index figure was 81, indicating a production about equal to normal. Perhaps you would like to calculate the per capita production index if the United States undertakes to feed about 70,000,000 persons in addition to our domestic population, which in 1942 was over 135,000,000 persons. To do this, divide the production index of 127 for 1942 among $135 + 70 = 205$ millions to get a per capita index of 62.0 —remembering incidentally that we didn't do much of a Lend-Lease job last year. We are, however, doing a lot better in 1943. Governor Townsend has broadcast that the civil population will have to get along on 25 percent less than the total produced. In 1943 our probable population will be about 137,500,000 persons and if we divide the Department of Agriculture's intention-to-plant index of 128 by 207,500,000, we get a per capita index of 61.7, which is to be compared to our normal peacetime production index of 79–81. You will note that 61.7 is about 25 percent less than 81. Maybe that is where Governor Townsend gets his idea of 25-percent less consumption.

So What?

Agricultural production has been expanding over the years, following in a crude way, the population trend. It has not, however, gone ahead of the population trend as rapidly as the uncorrected USDA index figures would show. Nor has it done a so much larger job in this war than it did in the first World War that anybody can crow about it.

Agriculture has done a lot, but it has not been expanded enough to meet all current internal and external demands, nor has the food processing industry been able to expand its production enough. Enough to do what? Enough to feed our Allies without marked tightening of belts at home; enough to permit, in addition, Governor Lehman to plan to feed North Africa and liberated European populations (when liberated); enough for the U. S. Department of Agriculture to be justified in anything but an attitude that we are lucky to have done as well as we have.

You can't eat indexes (or indices, if you are a purist), but even if you could eat them they are not big enough to be happy about, nor are they big enough to permit doing all the things we have an obligation to do in contributing food toward the war effort. We need to do much more, and to that end our energies should be directed.

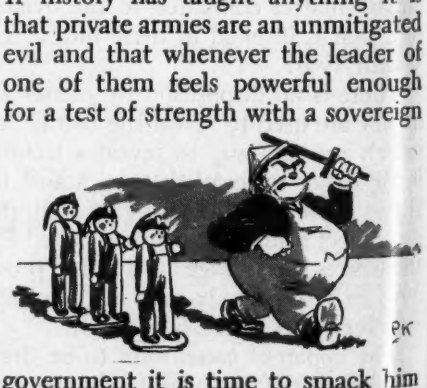
L. V. Burton EDITOR

The Talk of the Industry

• CORK has begun to come in from North Africa as "ballast," according to the Washington news ticker—an explanation that doesn't explain—along with steel scrap from the battlefields. But it is good news, and if enough of both are shipped here many a closure and equipment problem will vanish.

• FROM K. C., Mo., comes a tale of an Austrian refugee food chemist who has teamed up with a native American to manufacture imitation caraway flavor, synthetic cinnamon and eggless eggs. Do none of the refugees ever bring anything of solid merit? All of whom we have heard are specialists in such phonies. Maybe that's why they are refugees.

• JOHN L. LEWIS'S recent activities suggest a striking similarity to some of the private armies in Europe that led up to the Fascist governments and ultimately to the Second World War. If history has taught anything it is that private armies are an unmitigated evil and that whenever the leader of one of them feels powerful enough for a test of strength with a sovereign



government it is time to smack him down. It may sound Machiavelian, but ol' Mach was a practical person.

• PAPER-MILL operations in May were more than 10 percent below May, 1942, which, though not unexpected, has an ominous sound. For many months one branch of WPB has been warning of a prospective paper shortage. For even more months another branch of WPB has been encouraging many users of packages to use paper instead of other material. Conversions like this can't do any good at all without using paper—but paper production is becoming smaller.

Grade Labels Again

Grade labeling under OPA directions would be about as perfect a procedure as any young economist or lawyer could devise to mislead the public. FOOD INDUSTRIES has no phobia against grade labels for those who want them. But under OPA price ceilings it will be the tendency of the consumer to expect uniform prices for each grade, regardless of the various differences of manufacturer's invoice, prices and various differences in transportation and distribution costs.

Until OPA can equalize all costs from farm to retail store for all manufacturers of a given item, the various brands bearing the same grade will continue to sell at differing prices.

While we have no desire to increase the inflationary forces of the day, we cannot refrain from observing that OPA experiments are a pretty expensive way to teach the most elementary facts of distribution and ordinary business to OPA personnel. It ought to be obvious that you can have uniform grades without uniform prices, or uniform prices without uniform grades, but you cannot have both simultaneously.

Claim Department's New Importance

Prentiss Brown's courage in attempting to roll back food prices on to the producers is not to be denied, neither is the Administration's brass in planning to offset the producer's loss by direct subsidy from government funds, especially after Congress has previously voted down such proposals.

It begins to look as if the claim department will be the most important department in the food distribution and processing industry.

Now we know where to put some of those little needed salesmen to work. Selling the roll-back to the supplier! Egad, what a job!

High Cost of Poor Quality Control

Some big lots of off-quality or inedible egg powder have figured in the news of late, together with the names of their producers who are now under indictment for conspiracy to defraud the government. It is charged that 650,000 lb. of previously rejected lots of powder had been sold to the government at about $1.00 a pound, and that other questionable practices had taken place. Apparently the tip-off came from complaints from England and Russia.

Until the courts have ruled on these cases our comment is confined to the high cost of poor quality control or its complete absence. The aggregate sum involved is about $800,000—a tidy sum, indeed.

It is difficult to see how any business could produce so much as 650,000 lb. of bum stuff without the management knowing what it was doing.

When a firm unfortunately produces any 'way off quality or inedible foods, past experience has shown that the cheapest way out is to get it clear off the market, even dump it.

Home Dehydration Of Dubious Merit

It would be a serious blow to a young industry if home dehydrators do a poor job and give dehydrated foods a black eye. If management of an industrial operation, with the aid of automatic instruments and scientific quality control, has difficulty in learning how to do a satisfactory job, what chance has the average housewife with limited knowledge and almost primitive equipment?

Home canning, by contrast, has been through many of the vicissitudes of youth. A standardized practice is in existence for the use of those who can get the equipment, backed by the successful experience of a big industry. Results are definitely predictable for canning, because of the long industrial experience. But dehydration results in the home are unpredictable. The test of a satisfactory product comes, not the day after it has been dried, but several months later.

• SOMETHING NEW has been added. "Apple honey," or concentrated apple juice, has been added to Old Gold cigarettes to take the place of glycerine, which may no longer be used as

a moisture-retention agent. Apparently the monosaccarides do just about as well.

International Food Conference

Up to now we have been unable to learn enough about the Hot Springs, Va., International Food Conference to comment on it, other than to know that we were not invited, nor even allowed to observe the proceedings. Apparently you will have learned all that there is to be divulged from newspaper accounts before the July FOOD INDUSTRIES can reach you. The secrecy surrounding the conference appears to be an absurd mistake of policy, suggestive of something to be concealed.

Mr. Byrnes Aids Food Preservation

Contrary to the situation in most industries, canners have been seeking the right to raise workers' wages which were frozen last fall by order of Economic Director, James F. Byrnes. Unable to compete with nearby farmers, let alone munitions industries, the labor outlook for this important branch of the food processing industry was bleak indeed.

Mr. Byrnes has at last consented to voluntary wage increases up to 8 percent above nearby rates for farm labor, but there must be no increase in selling prices nor resistance to justifiable price slashes ordered by OPA. Which transfers the food problem from the production department to the legal department.

Apparently the theory is the familiar New Deal economic dream that bigger volume will take care of any increased costs.

Well, at least there is some hope of getting the production, and we opine that warehouse receipts will be excellent bank collateral next autumn, presuming that the weather permits production. 'Nuff said.

Piecing Out Shortening

Since there appears to be no substitute for shortening, all users of the commodity have been on an active search for some way "to piece out" the limited supply, as one manufacturer has put it. Whole fat soya flour, in amounts up to 15 percent of the total flour, seems to be one way of getting some of the needed fat. Specialty bakers have reported using whole fat soya flour in amounts up to 50 percent of the amount of shortening used. Since such soya flour at about 7 cents has about 20 percent of fat compared to shortening at about double that figure, the piecing-out procedure is also something of an economy.

• INSTITUTIONAL sales of frozen foods have become a war casualty. Because of war demands, particularly for the Army, the institutional or mass consumer-market sales of one of the largest frozen food operators in the country have had to be entirely cut off. Formerly, 40 percent of the company's total production was sold in institutional-size packages. Today the company advises that none of its former institutional customers will be able to get any more.

Trouble in Dehydration Industry

Apparently the government is having just as many problems in learning how to buy dehydrated foods, especially vegetables, as the new industry is having in learning how to produce the sort of goods that are needed.

Some newcomers to dehydration of vegetables, having no previous manufacturing experience, let alone food processing experience, have suffered economic unhappiness over their initial contracts. But neither have experienced food processors who are new to dehydration been exactly pleased with the results.

Some of the newcomers have fallen hard for a fallacy. They saw only raw material at 2½ cents a pound, sold after processing at, say 36 cents a pound. The meaning of a drying ratio of 6 or 8 to 1 was ignored or never known. Overhead, depreciation and repairs were not considered or correctly estimated when figuring probable costs. No allowance was made for growing pains, for experimental lots that could not meet specifications, for scorched lots. Result—acute and understandable anguish.

But the government which accepted contracts at some of the prices of the recent past has not been very much more far-sighted than some of the inexperienced dehydrators when setting prices at some of the figures used in 1942.

Good buying practice should permit the seller to recover costs, overhead and a reasonable profit except probably for the hopelessly inefficient. An overexacting buyer can dry up the source of supply. If the government does not need the goods that is one thing; but if production is needed, the government must learn to look beneath the surface of things to determine what is a fair price.

Oldtimers in the business have been very astute in not holding a price umbrella over the newcomers. But, we repeat, if the government really expects to get the production it has been talking about since last December, the government must learn to buy on a more intelligent basis.

The situation calls for mutual understanding. Both parties have much to learn.

Postwar Planning As Others See Us

Richard M. Lawrence, Atlas Powder Co., has compiled a long list of infant and young industries that are expected to experience a rapid growth in the postwar period. The list, too long to print here, includes:

Dehydrated foods	Lignin derivatives
Flavor stabilizers	Paper bottles
Frozen foods	Rural food lockers
Hydroponics	Stream-pollution control
Infant foods	Vitamins

Many of us are wont to believe that postwar planning is for the other fellow, not for the staid old food industry. But here is what a nonfood manufacturer finds in a list of 60 potential winners.

This list omits compressed foods, but aren't there others that ought to be included?

Hors d'Oeuvres

• This slogan ought to be placed on the mental bulletin board of executives in food plants: "You've just begun to scrap!" In industrial salvage, as in many other things, one "quickie" job isn't satisfactory.

• *On his recent visit to Fort Benning, the President saw a detachment of troops "capture" a small village, and "hand grenades" burst so close to him that fragments struck the side of his car—the grenades were made of potatoes stuffed with gunpowder. Personally, we'd prefer our spuds served up on a platter.*

• Three West Virginia judges have ruled that beer is intoxicating, agreeing that the legislature told a statutory lie when it declared the beverage to be otherwise. Perhaps the judges studied the matter longer than the legislators.

• *FTC says it is misrepresentation to advertise grape juice as a cure for obesity. But these days it is doing consumers a service to tell them that a product is low in calories.*

• Here's a cure for strikes, sure and simple: When a man voluntarily quits work, cut the point value of his food coupons in half—idleness requires few calories anyway. Yet, a man without guts enough to back the war effort has as big a stomach as anyone else, which puts a point in the penalty.

• *Pectin used in conjunction with sulfa drugs has produced "amazingly wonderful" results in healing foot injuries. So after the war pectin powders can be marketed as "foot ease."*

• Having successfully substituted apple sirup for glycerine in cigarettes, research scientists are now working on a method of using it in cosmetics. Which ought to make necking nutritious—if you need another reason for it.

• *The president of a poultry association in the Argentine claims that the yolks of Argentine eggs have a better color and are richer than those of U. S. eggs. We wouldn't know about that, but many feel that the Argentine has laid a very large egg in staying aloof in the defense of democracy.*

• In OPA 2413, a misplaced parenthesis incorrectly excluded prune juice from the list of rationed fruit juices—a case where punctuation made a big difference to the prune.

• *Many years ago meat cutters were distinguished gentlemen who wore silk toppers and cut-a-ways. And today a butcher with some beef is the most popular man in the community. Which proves either that history repeats itself or food is more important than most Americans had thought for many a year.*

• By virtue of knowledge gained in designing automatic machines to make tin cans, American Can Co. is making torpedoes at a rate six times as fast as required by its contracts. Which is by way of being food for thought for Hirohito. F. K. L.

Value of Brine Peeling Tested

Method tried at USDA laboratory. Advantages include low cost of salt, absence of personal hazard, and permissible carryover

THIS is a brief preliminary report on a method whereby operators of vegetable processing plants can peel potatoes, rutabagas and possibly other root vegetables by scalding them in a hot saturated salt solution and then removing the peel in a suitable washer. The brine solution can be brought to a temperature higher than that of boiling water—that is, to 228 deg. F. under sea-level conditions, or 16 deg. above the boiling temperature of water. Brief immersion in the high-temperature brine bath softens the cells adjacent to the skin, thus loosening it from the vegetable. Since the method has certain advantages in comparison with other methods, it has been given experimental trial at the Western Regional Research Laboratory.

Procedure

A saturated brine solution is prepared by adding common salt (NaCl) to water in the ratio of approximately 3.3 lb. of salt per gallon of water. The weight of 1 gal. of the solution is about 9.6 lb. This solution is brought to boiling temperature, and the washed vegetables are held below the surface of the boiling brine for varying periods of time. This interval must be determined by trial for each vegetable and also for various lots of the same vegetable if the quality varies. Excessive scalding will result in high peeling losses, whereas too short a treatment will leave much peel to be removed by hand. When the vegetables have been properly scalded, the skins remain intact. These skins can then be removed by washing in a suitable washer equipped with a moderately high-pressure spray (approximately 125 lb. per square inch).

The scalding procedure can be carried out either as a batch or as a continuous process. The latter method is preferable, however, and may be accomplished through the use of a specially designed draper-type brine peeler described below. A standard draper-type lye peeler can be used as a brine peeler provided it incorporates means for holding the vegetables below the surface while they are being conveyed through the bath, and provided the materials of construction of the machine are not affected by the concentrated salt-water solution. It should be pointed out that all vegetables float in a concentrated brine solution.

Equipment

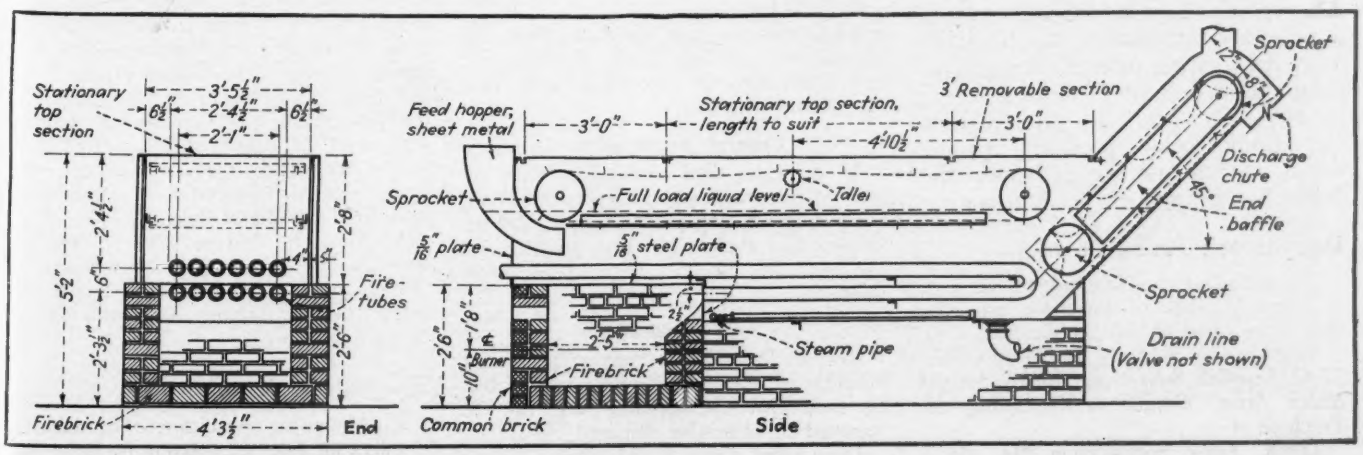
The U. S. Department of Agriculture has prepared two brine peeler designs for use with either gas or oil as a fuel. Steam is used for rapid initial heating during "start-up" periods. These units can be modified for use with indirect steam heating. The designs are shown on USDA Drawings Nos. D-109 and D-111, and are designated as designs No. 1 and No. 2, respectively. The first design shows the construction details of a unit capable of processing approximately 8 to 10 tons of potatoes per hour, with a 6-minute retention period in boiling concentrated brine. The capacity will vary with other vegetables in accordance with time of retention. Similarly, the second drawing shows the construction details of a unit capable of processing approximately 2 to 3 tons of potatoes per hour, with the same retention period. These designs may be obtained on request from the Western Regional Research Laboratory, Albany, Calif.

The USDA peelers operate as follows: The vegetables are held below the surface of the brine by means of a wire belt fitted with vertical advancing flights. As the product nears the discharge end of the tank, it is picked up by a draper belt. The excess salt is washed from the surface of the product by a light water spray which serves also as a make-up water supply to replace water lost through evaporation. From the draper belt the product is discharged directly into the washer where the skin is removed.

Discussion and Comparison With Other Methods

Some of the advantages of the brine method as compared with lye peeling are as follows: The salt with which brine is made costs approximately one-

* Information from Western Regional Research Laboratory, Albany, Calif., Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.



Cross sectional diagrams of smaller of two brine peelers designed by the U. S. Department of Agriculture. This unit has a capacity of approximately 2 to 3 tons of potatoes an hour with a 6-minute retention period. A larger unit has a capacity of 8 to 10 tons.

fifth as much as caustic soda per pound or about three-fifths as much per charge. Salt can be handled without personal hazard, whereas caustic soda may cause burns. Both salt and caustic soda are lost by adherence to the surface of the vegetable, but in addition lye gradually loses its strength by chemical reaction and consequently must be removed more frequently than the salt. Carry-over of salt on the vegetable is not detrimental, whereas even a trace of lye left after washing is highly undesirable. Lye may cause discoloration of the surface of the product and if the treatment is too drastic will ruin it.

Excessive retention periods with either method will soften the surface too deeply and result in excessive peeling loss. The effect of high altitudes on reducing the boiling temperature of the liquid may prevent successful use of brine peeling in some localities. The normal peeling loss with brine peeling ranges between 12 and 15 percent on potatoes, and the overall loss, including paring and peeling, will range from 13 to 18 percent.

Trial Runs Advised

Brine peeling has not undergone a full-scale commercial test as yet. Experimental trial runs are recommended for plants that are handling potatoes, rutabagas, sweet potatoes or carrots.

Numerous other high-boiling liquids have been studied. Mineral oil is the only other fluid that has given satisfactory results, but further study must be made before it can be recommended.

Army Specifications For Dehydrated Foods

Tentative specifications for dehydrated foods for Army use have been issued by the Quartermaster Corps. The Army requirements for various dehydrated products have been published in previous issues, and specifications for other products are given here

KNOWLEDGE of exact Army specifications for dehydrated foods is necessary information for those already dehydrating products for government use as well as for those planning to enter the field. In the tentative specifications below, packaging requirements in each case are given after the description of product specifications.

Dehydrated Prune Powder

The following specifications, of the issue in effect on date of invitation for bids, shall form a part of this specification:

Tentative U. S. Army Specification No. 22-42, Supplies, Subsistence, for the United States Army, Conditions Governing the Purchase of.

U. S. Army Specification No. 100-2, Standard Specifications for Marking Shipments.

Quartermaster Corps Tentative Specification—Prunes; Evaporated (or Dried), dated August 3, 1942.

Material and Workmanship

Material—Dried prunes used for dehydration shall meet the requirements for Grade C as indicated in Quartermaster Corps Tentative Specification for Prunes; Evaporated (or Dried), except that they shall count not more than 100 to the pound and the minor defects, listed in the above-mentioned tentative specification as affecting color of prunes, shall not be considered objectionable for the use of prunes in preparation of dehydrated prune powder if the fruit is otherwise sound. Only prunes that are free from pits or pieces of pit shall be used for the preparation of dehydrated prune powder.

Workmanship—The product shall be prepared and packaged under modern sanitary conditions, in accordance with best commercial practice.

General Requirements

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug and Cosmetic Act, and regulations promulgated thereunder. The product and packages shall be free from viable insect infestation.

Detail Requirements

Dehydrating—The temperature and humidity of the air during dehydration shall be such that the product will not be scorched or otherwise damaged.

Dehydrated Product: Moisture Content—The moisture content of the product shall not exceed 24 percent by weight. Two percent of an approved anticaking agent may be used. The product shall be free from artificial coloring and chemical preservatives. At least 98 percent of the product shall pass through a U. S. Standard No. 30 sieve. The total count of viable microorganisms in the product shall not exceed 5,000 per gram (inclusive of molds, yeasts, and bacteria), and in no case will the yeast exceed 500 per gram.

Rehydrated Product: Rehydration—The product shall rehydrate satisfactorily within a period of ten minutes when 12 oz. of cold water (75 deg. F.) is stirred into a mixture of 2 oz. of sugar and 5 oz. of prune powder.

Color and Flavor—The rehydrated product shall possess the characteristic color and flavor of cooked dried prunes.

Inspection and Tests

Unless otherwise specified, inspection shall be made at the point of origin. Moisture determination shall be made by the vacuum-oven method for fruit and fruit products. Chemical analyses, if required by the purchaser in the examination or testing of samples and deliveries under this specification, shall be made in accordance with methods of the Association of Official Agricultural Chemists in effect on date of invitation for bids. Awards will be made only after samples of the product and package have been approved by the Subsistence Research Laboratory, Chicago Quartermaster Depot.

Marking for Shipment

Packaging—Unless otherwise specified, dehydrated prune powder shall be packaged in bags manufactured from a film consisting of two sheets each of not less than 0.0009-in. thick, moisture-vapor-resistant, heat-sealing, regenerated cellulose, laminated with not less than 6 lb. of permanently plastic adhesive per 1,000 sq.ft. In all instances, this bag shall be completely sealed by means of heat or adhesive. The adhesive used shall impart no off-flavors to the product. These bags shall be of such a size that they will be approximately 75 percent filled by the specified amount of product.

Labeling—In addition to meeting the requirements of the Federal, Food, Drug and Cosmetic Act, and regulations promulgated thereunder, each package label shall furnish necessary directions for use.

Packaging—Unless otherwise specified, the product shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

Marking—All cartons shall be stenciled or printed on one end as follows: number of units, name of product, date (month and year), contract number, name and address of manufacturer.

Dehydrated Cranberries

The following specifications, of the issue in effect on date of invitation for bids, shall form a part of this specification:

(Turn to page 122)

Small Dehydraters for Vegetables

By S. G. DAVIS, W. B. ESSELEN, Jr., and F. P. GRIFFITHS
Food Technology Laboratory, Massachusetts State College, Amherst, Mass.

PART II*—Design of a slightly larger dehydrater than those discussed in Part I and the preparation of vegetables, dehydrater operation and costs are discussed in the second half of this article. The first part appeared in "Food Industries" for May

A DEHYDRATER which has been extremely useful in pilot operations and for the development of new products for commercial dehydration is also adaptable as a relatively inexpensive "several family" dehydrater. Such an arrangement would result in a substantial saving of material, and would allow for a unit of greater capacity, with better control of dehydrating conditions through more elaborate construction. Since steam and steam controls are available in few places, electric heat is more generally practical.

Figures 5 and 6 show the batch dehydrater used for work of this type in the laboratory (unit built by C. E. Gunness, head of the department of engineering, Massachusetts State College). The cabinet is of plywood and uses a 12-in. ventilating fan for circulation of the air. Two "Nichrome" coils, totaling 1,650 watts, are used as the heat source. These are mounted around the interior of the galvanized-iron fan housing, as shown in the illustration. Simple baffles attached to the rear of the tray holders, widest at the top and tapering to the bottom, are arranged to give uniform air circulation through all the trays at around 300 linear feet per minute. The tray holders are so constructed that the air passes through the trays rather than over them. A simple thermostat is used for temperature control, a "brooder" type thermostat with a range of 140-160 deg F. serving quite satisfactorily. Recirculation of the air and humidity are regulated by an adjustable exhaust outlet. The most practical capacity for the unit as illustrated is 18 to 22 lb. of fresh, prepared product.

Preparation

Vegetables to be used for dehydration should be dried as soon after harvesting as possible, preferably within a few hours. With the exception of some of the root varieties, most vegetables rapidly diminish in flavor and general quality after they are picked. A striking example of this is corn, which within a few hours loses a large proportion of its flavor and tenderness.

Equally as important is the selection of the vegetables at their optimum stage of maturity. The effects of overmaturity or undermaturity are unchanged by dehydrating operations, and while such

* Contribution No. 476 of the Massachusetts Agricultural Experiment Station.

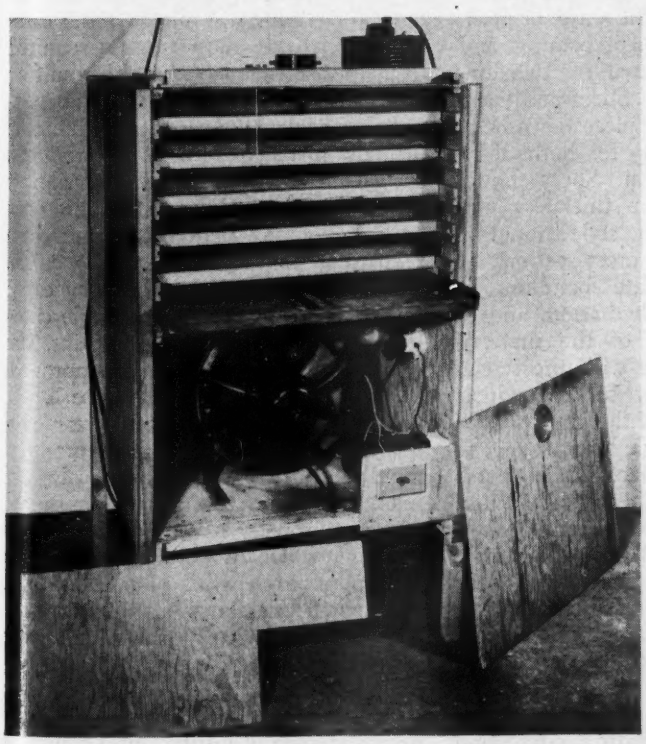


FIG. 5. Front view of pilot dehydrater with panels removed to show construction details. This is a slightly larger dehydrater than those described in Part I of this article.

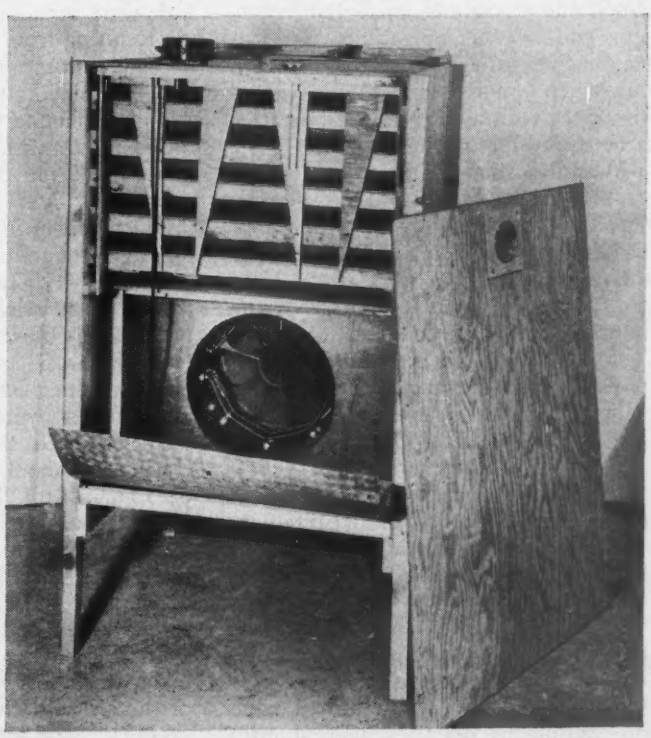


FIG. 6. Rear view of pilot dehydrater with panel removed to show position of heating units, baffles, location of thermostat, and air passage between trays and tray holders.

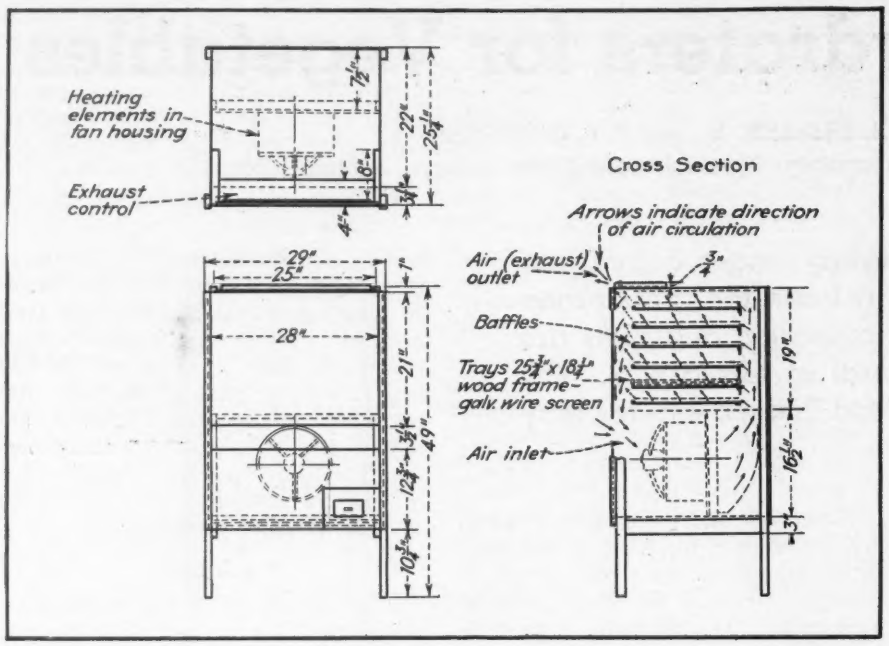


FIG. 7. Construction details of pilot dehydrater, which can also be used to serve a group of homes.

products might be equal in appearance in the dehydrated form to those prepared from properly selected raw materials, the difference in quality can readily be detected in the flavor and texture of the rehydrated product.

Procedure

The general steps in preparing vegetables for dehydration follow very closely the procedures employed in canning and freezing operations. For that reason they will be treated at length only when a more complete understanding of the reasons behind the operation is necessary for successful results.

Washing and Trimming – Since steam is preferable to boiling water for blanching, thorough washing is required. Particular care should be taken with leafy vegetables to remove all sand and grit, since even small amounts will show up markedly in the dehydrated product. Thorough washing will also show up bruises, blemishes and withered leaves, which must also be removed. Even bruises which hardly detract from the appearance of the raw product will in many instances cause undesirable discolorations in the dehydrated product.

Peeling—For small scale operations, hand peeling is the most effective method and results in the least waste. While methods for the various vegetables vary in some respects, space does not permit description of each type. Cruess and Mrak (1941), in a paper on commercial practices, present information on peeling and other steps of preparation which can readily be applied to small-scale operations.

Subdividing – Since dehydration is achieved mainly from surface evaporation, the greater the surface of the product, the more rapid is the drying process. To achieve this end, tubers and root vegetables are sliced, diced, shredded or riced, which not only facilitates drying, but also gives a product of distinctive appearance. Dicing or cubing is not recommended for small-scale work because of the waste of product resulting from such preparation and the added time required for dehydration and rehydration. Slices and shoestring or julienne style pieces have been found most satisfactory for both dehydration and rehydration. Slices should not exceed 3/16 in. in thickness, and products cut in julienne style should be no larger than this in cross section.

Traying—To facilitate handling of the products after dehydration, and to prevent discoloration of the material through direct contact with the screen from residues left by other products previously dehydrated, the trays should be covered with a single layer of cheesecloth. Absorbent gauze, 28x24 mesh of 36-in. width, has been found ideal for this purpose. Each 15-in. double-thickness section will provide ample material to cover four trays of the small dehydrater, and each piece can be used several times for the same product.

In loading the trays, care should be taken to allow for intimate contact of the air with the individual pieces of product, and adequate circulation around them. With sliced or julienne style products, the shape of the pieces will take care of this to a great extent, and most care should be given to spreading the product uniformly over the trays. With leafy vegetables, such as spinach or chard, on the other hand, the pieces should be so arranged that matting will not take place during subsequent operations.

Blanching—Changes in composition, flavor and appearance may be brought about by the action of the enzymes present in many foodstuffs. Despite their resistance to attack by molds, bacteria and other organisms, dehydrated foods may be spoiled as a result of enzyme action. While enzymes are sensitive to heat, they are not always destroyed or inactivated by the temperatures used in the dehydrating process, so special consideration must be given to their control. The treatment ordinarily employed for inactivation of the enzymes is called blanching.

The blanching process consists of heating the material in hot water, or preferably in live steam, for a suitable length of time. While the primary purpose of this treatment is to inactivate the enzymes, at the same time it serves several other functions as in canning and freezing.

In the course of the treatment, the product is also partially precooked, which not only sets the color, but also hastens the drying time by relaxing the product and allowing a more rapid diffusion of moisture from the cells. Equally as important, the precooking also facilitates rehydration of the material for serving. While in some cases only a relatively short time is required to inactivate the enzymes, the resulting improvement of flavor, texture and appearance make a longer blanch desirable in many instances. For some products, a satisfactory length of blanch is almost sufficient to cook the material, and only a short cooking period is required in preparing the product for the table. While prolonged blanching may cause increased loss of the water-soluble constituents and some of the vitamins, the storage qualities are definitely improved. Insufficient blanching, on the other hand, results in a definite lowering of quality. Improperly blanched products rapidly lose their color, and develop off odors and flavors. Spinach, for example, when improperly blanched, becomes a dirty gray color on storage and takes on a pronounced hay-like odor. Similarly, carrots will lose almost all of their color and develop a musty flavor and odor which makes them practically inedible. Preliminary experimental results indicate that the loss of vitamin and carotene during storage of insufficiently blanched products is greater than the loss resulting from a longer blanching period, owing to the activity of enzymes which

destroy the vitamins. Work in this laboratory indicates that longer blanching periods than usually recommended are required.

Improvised Equipment

With present equipment shortages, particularly in the home, blanching equipment must be improvised. The best procedure for the blanching of most vegetables is to have the product already spread on the trays, and to subject the whole tray to the steam process. This can be done in a large kettle, wash boiler or other vessel of sufficient size which can be fitted with a relatively tight cover. Approximately two inches of vigorously boiling water provides ample steam, and a light rack of either wood or wire serves to keep the trays above the level of the boiling water. The trays are stacked one above the other in such a manner that the steam has intimate access to all parts of the tray. This is of extreme importance, since adequate and uniform blanching is a requisite for quality products. Every piece must be heated through to the center. Because of this fact, and the limited height of the average vessel, not more than three trays of material should be blanched at once. It must also be stressed that the water be vigorously boiling during the entire blanching period. Since the size of the individual pieces has a direct relationship to the length of the blanching period required, it is advisable to keep the size of the pieces within the previously specified limits for the blanching periods recommended in Table I. Exceptions to this procedure are corn and beets. Corn should be blanched on the cob, cooled and the kernels then sliced off and trayed. Beets should be blanched whole, peeled and then subdivided. Compensation for these factors is made in the recommended blanching time.

If no vessel of sufficient size to hold a tray is available, the product must be blanched before traying. This can be accomplished by an arrangement similar to that for the trays, but instead of the trays a wire basket, strainer or similar container for the product is placed on the rack and subjected to the steam. Only a light layer of product should be put in the container at one time. For a common 8-quart kettle, each batch should be no larger than the individual tray load of the product. The advantage of this is twofold, since it not only helps prevent exceeding the steam capacity of the vessel, but also assures proper tray loads, since a considerable decrease in volume, particularly with leafy vegetables, occurs during blanching. With some products it may be necessary to stir up the material once or twice during the blanching period to assure complete heating of all the product. Also, in traying the blanched product, care must be taken to spread the material uniformly over the tray and prevent clumping of the pieces. Clumping will greatly retard the escape of moisture during the dehydration process.

Dehydrating—For small-scale work it is recommended that the same amount of heat be used throughout the entire dehydrating period. While it is possible to vary the temperature somewhat, using higher temperatures during the first part of the drying process, the decrease in time resulting from such practice is negligible in the long run. Furthermore, there is decided danger of harm to the product since it is difficult to readjust the temperature during the latter stages of drying when the products are most sensitive to heat.

Experimental studies have shown that a temperature of 145 deg. F. is the most satisfactory for small scale dehydration of the common vegetables. A good thermometer with a range up to 212 deg. F. should be kept in the dehydrater throughout the drying period, preferably on one of the middle trays. Before use, the dehydrater, with the trays in place, should be heated to the drying temperature and kept at that temperature, by proper adjustment of the heat source, for 10 to 15 minutes in order to make sure that the proper amount of heat will be maintained. When an electric heating element is used in the forced-air unit, this is done by variation of the number of fresh-air apertures. If the dehydrater has been properly constructed, the temperature during this period should not show a variation of more than 2 deg. between any of the trays. When the temperature has been adjusted, the trays can be removed and prepared. As little time as possible should elapse between the time the material is prepared and the time it is placed in the dehydrater.

In loading the dehydrater, the trays should be alternately staggered to form a channel for circulation of the air. When the trays are first entered, the temperature may drop as much as 20 to 30 deg. because of the change in humidity conditions and the heat required to bring the temperature of the trays themselves up to the temperature of the dry air. However, *the original heat adjustment must not be changed.* Within a short time the temperature will again go up to within a few degrees of the original setting, but will not actually reach this point until the product is nearly dry because of the presence of the water vapor carried by the air. Because of the fact that the moisture is carried off through the chimney in the natural draught dehydrater, the humidity will always be higher at the top of the cabinet, particularly during the early stages of the drying period. For more rapid and uniform drying, therefore, the tray order should be reversed two or three times.

Determination of Finish Point—There is little danger of food becoming too dry; the lower the final moisture content, the better is the keeping quality of the product. In general, the final moisture content of vegetables properly dehydrated in accordance with the above procedure averages around 5 percent, which is quite satisfactory. At this point the pieces are rigid and brittle; leafy vegetables should crumble to a powder when squeezed in the hand. If the given procedure has been followed, a simple test for the finish point consists of mounding up some of the dry material on the trays and inserting the bulb end of the thermometer into the mounds. If after 5 minutes of continued heating with the thermometer in this position the temperature of the product on all the trays is the same as that of the drying air, e. g., 145 deg. F., drying is complete. There should be no soft or moist pieces on any of the trays.

(Turn to page 108)

TABLE I—Blanching Times for Dehydrated Vegetables.

(Steam, 212 deg. F.)

Product	Time (minutes)
Snap beans	20
Beets	30
Carrots	10
Potatoes	10
Corn	25
Peas	10
Spinach	7
Swiss chard	9
Tomatoes (slices)	4

TABLE II—Comparative Costs of Dehydrating and Canning Vegetables in the Home.*

	Dehydration		Canning (Water bath, 212 deg. F.)		Canning (Pressure cooker, 240 deg. F.)	
	Gas (cents)	Electricity (cents)	Gas (cents)	Electricity (cents)	Gas (cents)	Electricity (cents)
Food materials	4.05	4.05	4.05	4.05	4.05	4.05
Container	0.90	0.90	3.00	3.00	3.00	3.00
Fuel	0.40	1.60	0.33	2.54	0.20	1.60
Total	5.35	6.55	7.38	9.59	7.25	8.65

* Costs are compared on the basis of one pint of canned material and its equivalent in dehydrated products. Costs are for snap beans, corn, spinach, carrots and tomatoes.

Simple Multiple-Loop Method Speeds Bacterial Counts

By ANDREW MOLDAVAN
Guaranteed Pure Milk Co., Ltd., Montreal, Canada.

Pipettes, culture dishes and dilution blanks are eliminated in this simplified technic for counting bacteria. The apparatus is of extreme simplicity, easily made and easily washed, and as many as 400 samples can be handled at one time

THOSE who deal with the practical angle of bacterial control of milk or foods know that plate counts are only a means to an end, and that the true object in laboratory control is not so much to estimate the number of colonies of bacteria per milliliter as it is to determine the relative sanitary importance of the bacterial types present and to try to draw the correct interpretation from these findings.

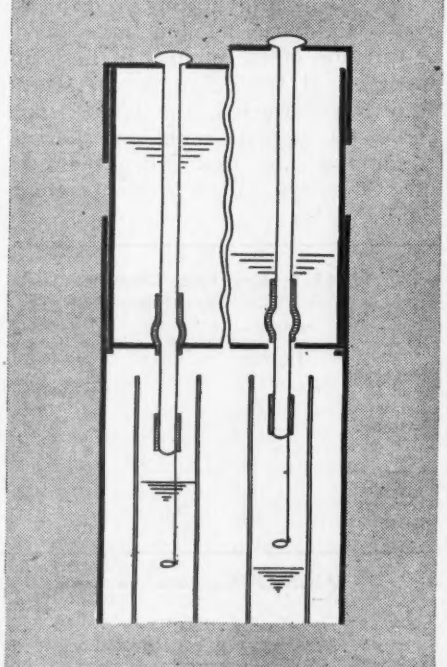
A test is at best an arbitrary one if it does not supply sufficient information to locate economically and as rapidly as possible the sources contributing to an undesirable or abnormal bacteria content.

The chief fault of the standard plate count used for milk does not lie in its technic or in its lack of mathematical accuracy, but in the fact that it is uneconomical and time-consuming. Too often attempts are made to draw hasty, non-conclusive deductions from a single test or from too few tests. A single plate count from a sample taken at random may condemn a supply, but seldom offers a foolproof diagnosis making it possible to remedy faulty conditions.

If as many samples as required were taken at every step all along the milk line from the cow to the milk bottle, and the results of these tests, both in colonial numbers and in groups of significant bacterial types, were tabulated in a comprehensive manner, the bacterial picture would be self-explanatory. Indeed, the scientific meaning of this picture, as well as the practical conclusions, might differ from our present hit-and-miss interpretation of results based on samples taken at random.

Any new technic which, without adding to laboratory labor and expense, would allow carrying out of systematic and continuous chain-tests on daily supplies, even at the cost of some of our present refinements, would provide the means of a specific and clear-cut diagnosis of conditions as affected by bacteria.

Myers and Spence,[1] working with a similar idea in mind, have offered a technic which is simpler and more economical than the standard plate count. Briefly, it consists in the transfer of a loopful of milk to 4 ml. of melted, cooled nutrient agar (45 deg. C.) in an oval test tube placed in a slanted position. A loop-pipette technic which the author suggested is even more rapid, but in comparative tests does not show as many colonies of bacteria as the Myers and Spence technic.



Sketch showing the position of the loop and stopper, while gathering milk sample (left), and while depositing the sample in the incubation tube (right).

The test now developed is an outgrowth of these two methods. Each loop is dipped in a sample of milk, then the filled loop is held over an empty sterile incubation tube and a predetermined quantity of nutrient medium is permitted to flow over the loop into the tube, which is then ready for incubation. In this way dilution blanks, petri dishes and pipettes are dispensed with.

In order to carry out a large number of tests in a short time, apparatus has been designed so that many loops can be dipped into milk samples and then the contents of the loops can be transferred into incubation tubes in one operation. Holders are provided with identical spacing for the sample tubes and the incubation tubes, which are held vertically. A reservoir for the culture medium is provided with corresponding holes in its bottom, and the rods which act as stoppers for these holes also carry the calibrated loops. With the holes closed, the loops are dipped into the sample tubes, then the entire group of filled loops is transferred to a position over the incubation-tube holder, culture medium is poured into the reservoir, and the stoppers are raised all at one time to permit the medium to flow over each loop into the proper tube. Guides provided on the apparatus control the depth of immersion of the loops and the height to which the stoppers are raised. The incubation tube holder also serves as a rack in the autoclave or incubator.

The apparatus is of extreme simplicity, it is easily made and easily washed. The number of loop units may vary, according to the needs of the laboratory, from 16 to 400. A complete 400-loop apparatus would occupy about one cubic foot of space and therefore could be handled in any ordinary autoclave or incubator and might conceivably be made part of a field man's outfit.

With this small apparatus, limited in size by the number of tubes, as

many as 400 loop samples could be taken simultaneously from sample tubes, and the corresponding incubation tubes could be filled with the medium and milk samples, all in a matter of minutes.

Description of the Apparatus

Two identical sets of metal boxes or wire baskets to hold tubes vertically are required. Each upper corner is fitted with square guides 4 cm. long stopping 5 mm. above the tubes. The culture-medium reservoir is of embossed or welded stainless steel, 7 cm. in height, with a deep cover. Round holes 6 mm. in diameter are perforated through the box's bottom and cover, in such a way that the holes correspond to the center of the tubes in the tube holders.

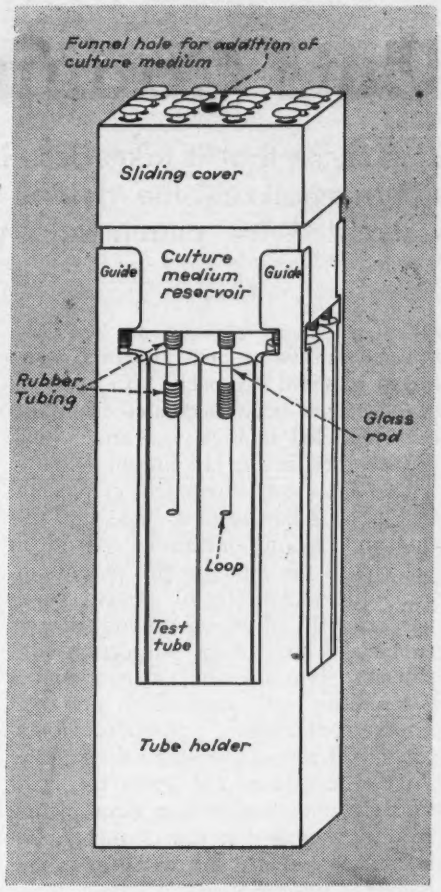
Glass rods 10 cm. long and 4 mm. in diameter, form the stoppers. The top end of each rod is flattened. A slight bulge, about 6 mm. in diameter, is formed on each rod 3 cm. above the tip. The rods are inserted vertically in the corresponding holes of the medium reservoir, leaving the lower end protruding 2.5 cm. through the bottom.

Two rubber-tube sections for each rod are required. A 2-cm. section is slipped over the rod's bulge, allowing 0.5 cm. of the section on the tip side. It is important that all these rubber-tube sections be slipped over the rods identically, as they act as stoppers for the liquid medium in the reservoir and regulate the amount of medium flowing into each incubation tube. A 1-cm. section is slipped over the rod's tip to hold the loop. The rubber tubes are made from thin-wall, nonsticky, wet-heat-resistant rubber of 3 mm. bore. Heat-resistant, semi-soft plastic tubes may be used as a substitute. If available, an elongated conical rubber stopper 10 cm. long would fill the same purpose as the glass rods and the rubber tube sections.

Calibrated 0.01-ml. loops of nickel-chrome wire or stainless steel wire, 4 cm. long, are used. For higher dilutions a 0.005-ml. or 0.001-ml. loop can be used. The handle of the loop is inserted for 1 cm. between the rod and the rubber-tube section covering the rod's tip. The loop, which is bent at a right angle with its handle, is located at about 3 cm. below the rod's tip.

Technic of Operation

The culture medium reservoir with its bottom holes stoppered by the bulging rubber-tube sections is placed over the tubes filled with milk samples and slid down along the guides to within 5 mm. of the tubes. After the loops have collected the 0.01-ml. milk samples, the culture-medium reservoir is transferred to the empty sterile incubation tubes and slid down along the guides. The loops automatically take their central position in each corresponding incubation tube. The medium, at 45 deg. C., is poured into the medium reservoir through a cotton-stoppered hole in the cover. The rods are lifted *all at once*, by sliding the cover upwards 0.4 cm. This opens the holes of the bottom and the medium flows freely and nearly equally over each loop, washing the 0.01-ml. milk sample into each incubation tube. Where slanted oval tubes are desired, the tube holder is slanted to an angle while the medium in the tubes is still liquid.



Complete apparatus for handling 16 tubes, showing the culture-medium reservoir in position above the tube holder.

Calibration of the Loops

The simplest and most rapid way to calibrate a loop or a series of loops[a] is the following:

Fill a standard 0.01-ml. Breed pipette with water, drain the wetted pipette but do not dry it; hold the pipette vertically, delivery end on top; rub a loopful of milk against the pipette's aperture (capillarity and gravity will take care of the suction); then modify the diameter of the loop until the correct reading in the Breed pipette is obtained. The 0.001 ml. loop, of course, requires 10 fillings to fill the pipette. The larger the diameter of the wire, the smaller will be the diameter of the loop required.

Loops of identical diameter used horizontally carry nearly twice as much milk as loops used vertically. This is a very important factor in calibration of loops. A loop which is removed rapidly or very slowly from a sample will gather only a small film of milk. The maximum amount of milk is collected when the loop is handled at about the same rate of speed as a dilution pipette.

Standardized loops cannot be expected to be as accurate as graduated pipettes but in the hands of an experienced worker they become valuable laboratory tools, and when properly used they can reduce the time requireed to locate points at which more detailed studies are required.

References

1. Myers and Spence, A Simplified Procedure for the Laboratory Examination of Raw Milk Supplies, *Journal of Milk Technology*, vol. 4, 18–25, 1941.

2. A. Moldavan, Detection of Thermoduric and Thermophilic Bacteria, *Canadian Dairy and Ice Cream Journal*, vol. 4, April, 1942.

Technologist in an industrial laboratory making bacteria counts on incubated culture tubes. The method described in this article will make it possible to prepare a much larger number of samples.

Large Fruit Cuts Canning Costs*

Pilot-plant operations show that it takes less labor to can large peaches than small and the yield is greater. Fewer man-hours required for pitting and packing

By L. O. VAN BLARICOM

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IT costs the canner less for pitting and packing peaches when he uses large fruit. Furthermore, the yield of canned peaches in cases per ton is greater with the larger fruit. Those are three factors which vary markedly with peach size and which are of vital importance to the canner. Table I, and also Figs. 3, 4 and 5, show clearly the relationship of peach size to pitting and packing rates and yields per ton.

Size vs. Labor, Yield

Table I illustrates the relationship between peach size, pitting rate, packing rate and yield in cases per ton. The pitting rate is based on 50 lb. of fruit per bushel, and represents the number of bushels pitted per person per hour. The figures showing packing speed represent the number of cases of No. 2½ cans, 24 to the case, which each packer filled per hour.

To obtain a better picture of the offset that these factors have on the finished canned product, the total man-hours required to pack 100 cases of peaches have been calculated from the data included in Figs. 3, 4 and 5, and are recorded in the last line of Table I. These facts are illustrated graphically in Fig. 6. It has been assumed that pitting and packing operations require 60 percent of the labor in the peach cannery, the remaining 40 percent being necessary for other operations such as cooking, warehousing, inspection and labeling. This division of labor agrees very closely with that which prevailed in the horticultural products laboratory at Clemson. Commercial canneries should be able to cut down the labor cost for operations other than pitting and packing by the use of more automatic equipment such as sirupers and conveyor systems.

Large Size Fruits Cost Less

To illustrate how the data in Fig. 6 might apply in a specific case, assume that a canner has the choice of buying either 2-in. peaches or 2⅜-in. peaches of the same quality at $1.00 per bushel. Also, assume that the canner is paying an average of 40 cents per hour for his canning labor. For the purpose of this comparison, consider that the yield in cases per ton and the labor for pitting and packing are the only two variable costs. (Costs of sugar, cartons, cans, and so forth, are not considered here.) Table II shows the difference in labor and raw-material costs and the total cost per case of canning the two sizes of peaches.

FIG 1. Peach pitting knife. Peaches are split in half and the pits removed.

It will cost the canner $1.37 for fruit and labor to can one case of peaches 2⅜ in. in diameter, while it will cost $1.77 to can the smaller size, assuming that he pays $1.00 per bushel for the peaches in both cases.

Costs Determined by Studies

Early in 1941 the South Carolina experiment Station established a horticultural products research laboratory at Clemson Agricultural College. One of the major objectives of the laboratory has been to study the best methods of canning the Southern freestone peach and to develop other byproducts such as juice, nectars, jams and butter. At present there are approximately 5,000,000 peach trees in the state of South Carolina and only a little more than half of these are now in bearing. Overproduction as far as fresh fruit is concerned is therefore imminent.

During the 1942 peach canning season, records of yield, pitting speed, and canning speed were taken with various

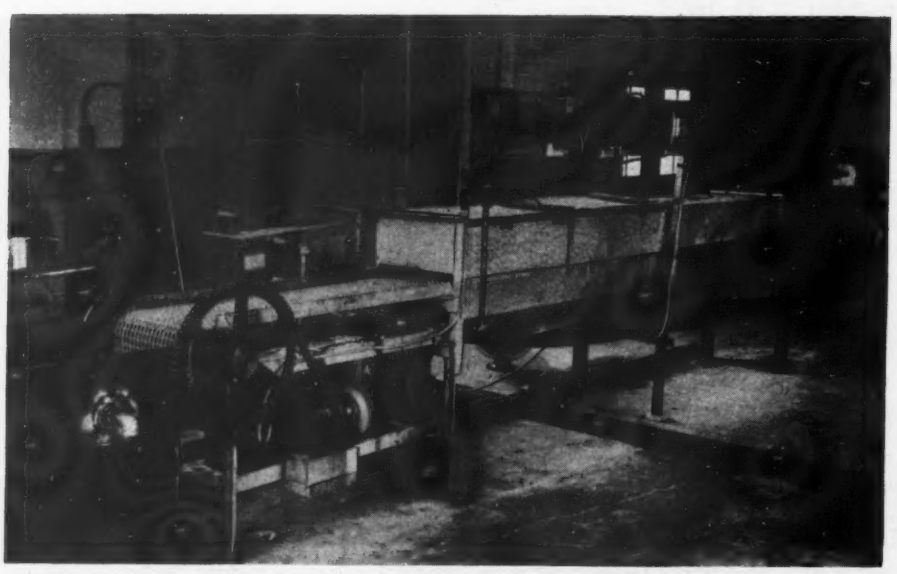

FIG. 2. Experimental lye peach peeler. Halved peaches are placed on a flexible steel belt and conveyed under sprays of lye.

* Contribution No. 102 from South Carolina Experiment Station.

TABLE I—Relationship of Peach Size to Pitting Rate, Packing Rate, Yield and Labor Requirements.

	Peach size (diameter in inches)					
	1⅞	2	2⅛	2¼	2⅜	2½
Pitter's rate in 50-lb. bushels per hour	2.02	2.29	2.94	3.31	3.55	4.14
Packer's rate in cases per hour	.....	2.38	2.94	3.14	3.47	3.84
Cases per ton of peaches	32.2	32.6	39.4	36.6	39.1	43.5
Total man-hours required to pack 100 cases of peaches*	184	150	125	106	91	81

* These figures are based on the assumption that 60 percent of the labor for canning peaches is required in the pitting and packing operations.

TABLE II—Cost, per Case*, of Labor and Fruit Required to Can Peaches of Two sizes.

Size of peaches (diameter in inches)	Cases per ton [1]	Bu. per case [2]	Cost of peaches at $1.00 per bu.	Labor (man-hours per case)[3]	Labor cost per case	Cost per case, peaches plus labor
2⅛ in.	40.0	1.0	$1.00	0.93	$0.37	$1.37
2 in.	34.3	1.17	$1.17	1.5	$0.60	$1.77

* 24 No. 2½ cans.
[1] See Fig. 4. [2] See Fig. 4. [3] See Fig. 6.

sizes of peaches to determine the effect of size upon canning operations. The peaches were picked one to three days before the full-ripe or canning stage and were graded and sized immediately after picking. They were ripened either in rooms at 60 to 65 deg. F., or at prevailing room temperatures which ranged from 70 to 100 deg. F. The roller grader used divided the peaches into sizes which varied by ¼ in. in diameter. Approximately 2,000 cases of peaches were canned during the season, but data on some of the experimental lots and some of the early packs are omitted since these facts are not representative of the canning operations.

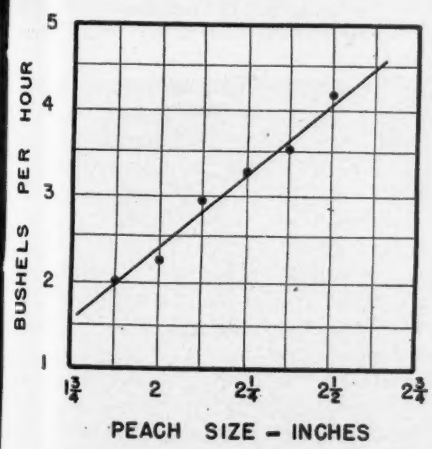

FIG. 3. Pitting speed versus peach size.

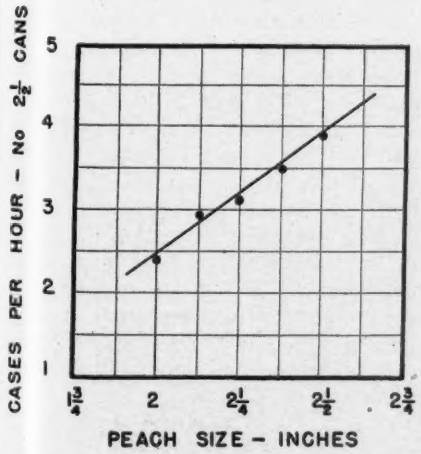

FIG. 4. How peach size affects the speed of packing.

Method of Operation

The information presented here describes a pilot-plant operation, and the results may vary to some degree from those obtained under large-scale operations. But they illustrate fairly closely what should be expected in a commercial cannery. The workers were paid by the hour, and their output of work may be a little lower than could be obtained where piece work or closer supervision is employed.

The peaches were pitted by a device which has been used in the Pacific Northwest for several years and is shown in Fig. 1. This knife appears to be the best splitting device for freestone peaches which commercial canners have found up to the present time. However, other types of freestone peach pitters are available.

The peaches were peeled in an experimental lye peach peeling machine (see Fig. 2). Briefly, the system used consisted of splitting the peaches in halves, removing the pits and placing them on a flexible steel belt with the pit cavity down. The halves were conveyed under sprays of lye at 205 to 212 deg. F., and then under high-pressure cold-water sprays. The strength of the lye varied from 3½ to 8 percent. After passing through the lye peeler, the peaches dropped into a tank of cold water for further washing, and then were carried to canning sinks on conveyor belts.

Can filling was done by hand from the canning sinks, each peach half being inspected by the packer before filling into the cans.

The peaches were canned as dessert-quality peaches, and small and large peaches were of the same quality except for size. Three to seven percent of the peaches was rejected because of overripeness, bruises and deformities. These were put into jam stock, etc., and were not included in the yield per ton, nor in the packing-speed data. Twenty-two to twenty-three ounces of halved peaches was filled into each can. This fill in weight resulted in a drained weight of 20 to 20½ oz.

Other Factors

There are other factors involved which a canner must consider—the production of large peaches, the size of canned peaches which consumers prefer, and the effect of size on grade standards.

Although many canners of freestone peaches have records on the effect of fruit size in their canning operations, there are many who do not have these records, and to them the data given should prove useful.

References

1. U. S. Patent No. 2,272,415.
2. *Canning Age*, vol. 23, No. 8, 416, July 1942.

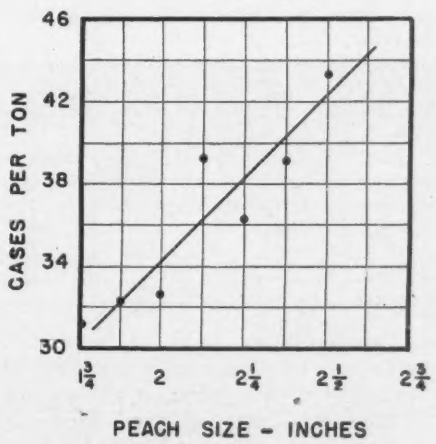

FIG. 5. Yield in cases per ton as affected by peach size.

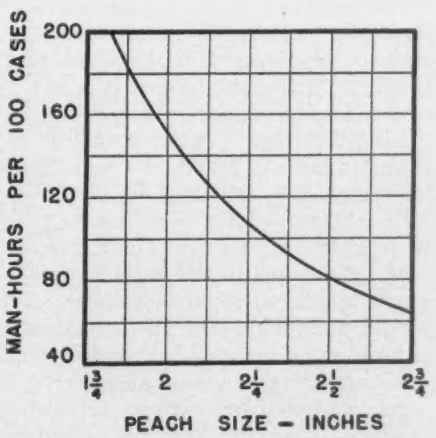

FIG. 6. Labor requirement as affected by peach size.

How To Make Better Malt Sugar

An improved product for infant feeding has been developed through critical study of the factors in manufacturing operations that affect the quality of the product

By W. O. GORDON
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THAT the manufacture of malt sugar can be improved by the six points listed below has been made clear by the work on which this article is based.

1. Cold water washing of the corn flour before processing permits gelatinization at atmospheric pressure. This results in the development of less color, and also enables the filtration after malt conversion to proceed with much less difficulty.
2. Use of distilled water from the evaporators, to avoid contaminating with natural inorganic salts from factory water supply.
3. The use of green malt instead of kilned malt, which introduces no coloration from this source and reduces the cost of production.
4. Activated vegetable carbon for final decolorization is more effective, less expensive and less cumbersome in operation than bone char.
5. Percolation of the thin sirup through artificial zeolites removes all the heavy metal ions which precipitate casein in boiled milk feeding formulas.
6. Refrigeration at the proper point precipitates soluble starch and protein, which may be removed by filtration while cold.

The clinical evidence for the use of maltose-dextrine sugar in infant feeding mixtures has been based on mixtures of maltose and dextrine of about equal proportions carrying a varying amount of impurities consisting of soluble starch, protein and inorganic material. High-maltose-content sugars are difficult of preparation commercially, and the preliminary experimental feeding has been based on malt sugar having at least 50 percent malt dextrine. Without questioning the merit of such a mixture as against one in which the dextrine content is variable, the clinicians have had little alternative, for pure maltose or pure malt dextrine could not then or now be obtained readily. However, it seems logical to assume that, in milk-modification formulas, the use of malt sugar containing approximately equal amounts of maltose and dextrine provides an immediate response due to the maltose, while the dextrine, by virtue of its slow conversion, serves as a reservoir of energy after ingestion. Fortunately for the pioneer manufacturers, who early found through experience that low-maltose mixtures may be more readily reduced to dryness, the experimental trend was shaped toward a product more easily obtainable.

This article deals with the manufacture of malt sugar having approximately equal proportions of maltose and dextrine, but it also points out the nature and sources of impurities in commercial dextri-maltose preparation. Some extraneous impurities may be entirely eliminated; but others cannot be eliminated as long as the source of diastase for the starch conversion is barley malt, and corn or wheat flour is used. This article, then, deals with a discussion of the commercial method for the preparation of infant-feeding sugars and indicates at what point and in what way improvement may be made.

Maltose has been widely used in the fermentation industry, wherein it is invariably used in solution, but its production in dry form has been quite difficult. This is because of its low melting point and its caramelization when heated, even under high vacuum.

What Malt Sugar Is

"Maltose" is incorrectly assumed to be synonymous with "malt sugar," but the term malt sugar quite generally identifies a mixture of maltose and dextrine in varying proportions, and is conceded to be the product resultant from the action of a diastatic enzyme upon gelatinized starch.

One might easily dismiss the matter by saying that malt sugar may be produced by the reaction of diastase upon gelatinized starch, then filtering out the foreign matter, concentrating and subsequently drying the filtrate which contains maltose and dextrine. Truthfully, this outlines the process of manufacture, but commercial production encounters more serious difficulty than this simple and accurate statement suggests.

The great bulk of the malt sugar now manufactured is used for infant-feeding purposes, but there are greater possibilities for its exploitation in the baking and confectionery industry, either as dry malt sugar, or combined with milk in sweetened condensed milk, both liquid and powder form.

Steps in the Manufacturing Procedure

The procedure that has been followed in the manufacture involves:

a. Cooking or gelatinization of the starchy raw material (corn flour, wheat flour, starch) under steam pressure.
b. Conversion (saccharification) by barley malt at a high temperature, followed by the first filtration.
c. Neutralization, followed by the second filtration.
d. Concentration to approximately 25 percent solids, followed by percolation through bone char, and the third filtration.
e. Concentration in evaporators.
f. Reducing to dryness on rotary drum dryer.

The basis of malt sugar manufacture is corn, and corn flour as the raw material seems to be most adaptable. One hundred and fifty pounds of ground malt is added to 2,000 gal. of water contained in a horizontal cooker equipped with a series of steam-jet inlets and agitation. The malt is stirred in the water at 120 deg. F. for one hour, 4,000 lb. of corn flour is added, and the whole is brought to 156 deg. F. Approaching this temperature, the mass becomes thick, but in a few minutes it becomes quite liquid, due to the liquifying action of the malt. Steam is admitted through jets in the bottom until the gage pressure is 10 lb. and the reaction mixture is cooked at this pressure for 10 to 30 minutes. The pressure is raised to 25 lb. and the mass is blown over into a glass-lined converter—a tank equipped with agitators. This sudden reduction of pressure results in an explosion of the partially gelatinized particles.

After the cooking process, the "soup" in the converter is cooled and treated with 200 to 300 lb. of ground malt, the amount depending upon its diastatic power. The time for conversion varies from one-half hour to three hours, according to the product desired. At 158 deg. F., the conversion produces approximately an equal ratio of maltose and dextrine and the time required varies from one-half to one hour. The

action of the diastase of the malt upon the gelatinized starch is to convert it into maltose and dextrine. In the plant the extent of the conversion is determined volumetrically, by using Fehling's solution, and by a practiced foreman the analysis can be performed in less than five minutes.

When the reaction of the diastase has proceeded sufficiently, the mash is heated rapidly (by steam syphon ejector) above 160 deg. F. to kill the malt action, and at 185 deg. F. the filtration is started. Unless the maltose-to-dextrine ratio is quite high, no batch can be filtered easily. Generally the pressure on the filters increases to 60 or 80 lb. per square inch, sometimes bursting the filter cloths, and occasionally a batch must be remalted in order that it may be filtered.

Filtering Difficult

The filtering operation is the cause of much annoyance. The standard continuous rotary filter has not proved satisfactory in the production of a clear filtrate, although many different and varying procedures have been used in preparing the mash. My own experience favors the plate-and-frame type of filter press for filtering out the residue from the malt sugar solution.

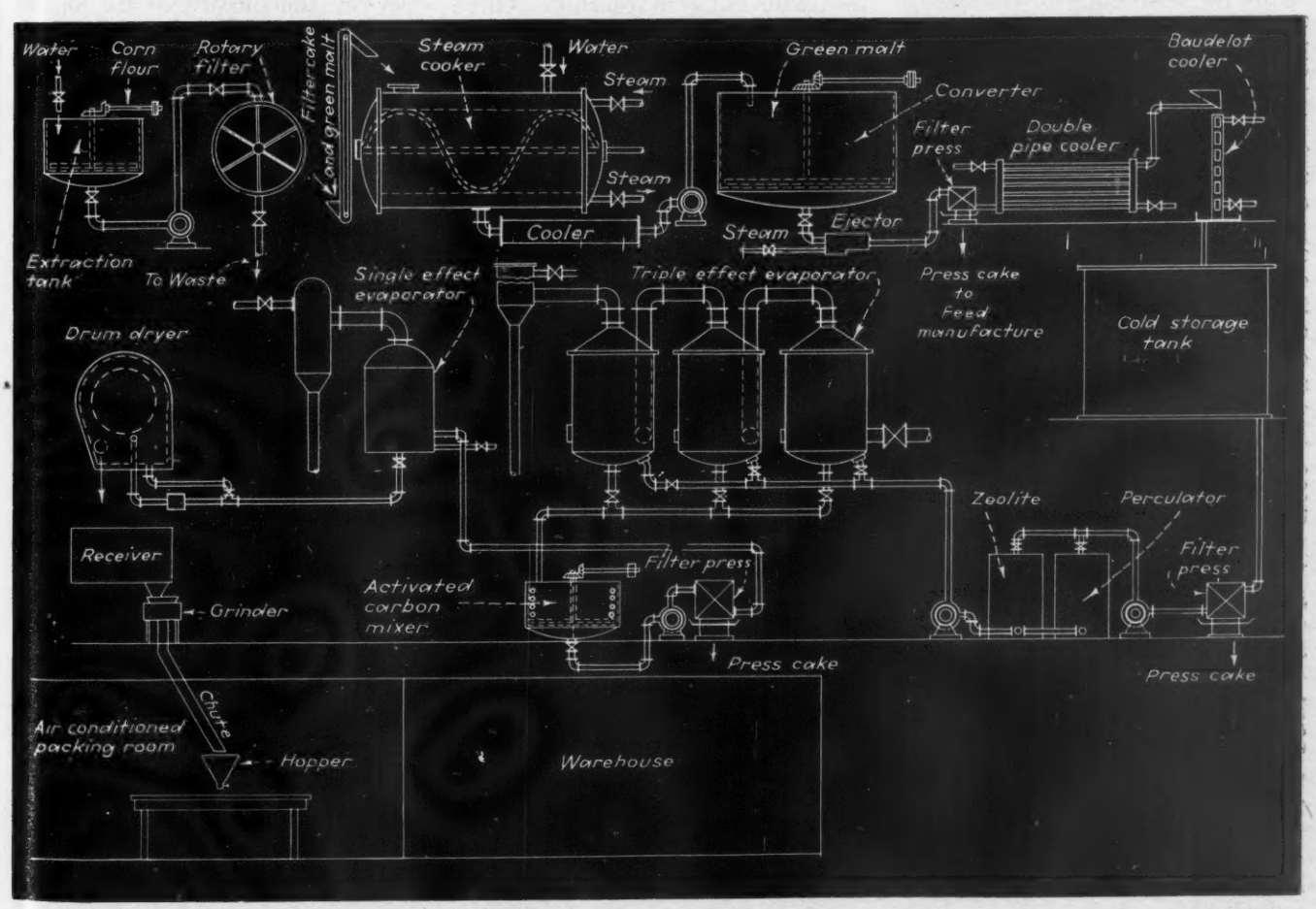
The liquor from one batch amounts to 2,500 gal., and filtration may be made in 1½ hours on two plate and frame presses, 30 plates to the press, 30 in. square, and having 1½-in. frames. The residue is conveyed to a rotary press, dried in a steam-tube rotary dryer and sold as feed. The liquor or juice is almost neutralized (pH of 7 to 8, but not over 8) with milk of lime or sodium hydroxide, with phenolphthalein as the indicator, taking care not to make the liquor alkaline, because this darkens the solution. After the second filtration the solution is concentrated by vacuum evaporation to approximately 25 percent solids and pumped to the char tower, to be percolated under pressure.

The decolorized solution is evaporated in a triple-effect evaporator, filtered, and evaporated to 55 or 60 percent solids in a single-effect vacuum evaporator, and pumped or sucked to the dryer.

The type of dryer used is known as the rotary vacuum drum dryer. It consists of a bronze drum or cylinder, 12 ft. long and 5 ft. in diameter, that may be heated internally with low-pressure steam, and which revolves in an enclosed housing, under vacuum. An arrangement sprays or spreads the sirup on the lower outside of the drum, and a film is dried as the drum revolves. By the time the drum turns almost a full revolution, the dry sugar is shaved off by a sharp scraper or knife. The sugar is carried by a reversible worm conveyor to either of two chambers or receivers, which have a cut-off valve from the drying chamber, so that the operation may be continuous by alternating the receivers. The dryer has a capacity of 800 lb. per hour.

Drying Needs Care

In drying, the speed of the drum and the temperature or steam pressure within the drum influence the color and, therefore, the quality of the finished product. For a very white product, the drum may be heated by steam under a vacuum of 3 to 5 in., which gives more readily controlled temperature than can be obtained by circulating hot water. Furthermore, the sugar must be removed from the drum the instant it is dry. Otherwise, the maltose will carmelize and turn dark, or high-maltose mixtures melt upon



Flowsheet for malt-sugar manufacturing process embodying the improvements in that process that are discussed in the accompanying article.

drying, and, of course, this means the loss of time and quality before the situation can be corrected. Without discussing minutely the details of the drying process, it may be said that a vacuum of 28 in. in the drying chamber is advisable, and in drying high-maltose mixtures this is quite necessary. Therefore, in attempting malt-sugar manufacture, high vacuum must be associated with high maltose percentage. This can best be obtained through the use of a surface condenser, wherein the vapor pressure of the cooling water is of no consideration. However, in using a barometric condenser, the vapor pressure of the condensing water is quite high in summer temperatures, and even with large pump capacity this high vacuum is difficult to maintain.

Factors in Plant Design

Located directly beneath the two receivers are the grinders which discharge into the hoppers of the packing machine where the product is packed in cans which may be sealed, or in barrels with waterproof liners for bulk shipment.

In designing the plant, the evaporators are located at least 34 ft. above the ground to make use of the barometric leg in the discharge of condensate to obviate the necessity of condensate pumps. This also permits of very short vapor discharge piping into the barometric condensers. More important is the location of the dryer to permit gravity discharge of the dry sugar. Malt sugar is very hygroscopic, and gravity discharge direct to the grinders and packing machine minimizes exposure and thus promotes the keeping qualities of the product. Furthermore, without the dryer being elevated, continuous operation can hardly be practiced. The cost of pumping sugar in solution as against elevating dry bulk sugar is the main reason for mounting the dryer so high.

Improvement in Manufacture

The experience of the writer has developed the following improvements, which are incorporated in the accompanying flow diagram.

1. **Filtration.** The first filtration of the converted starch had always been difficult, and the procedure finally determined upon involves extraction of the corn flour with water at room femperature with subsequent filtration on a rotary vacuum filter. The washed corn flour discharged from the filter is conveyed directly to the cooker and, after adding water and sufficient malt for liquefaction, is easily and perfectly cooked at atmospheric pressure by using live steam. This reduction in cooking temperature develops little coloration of the filtrate and results in the production of a much whiter product.

2. **Distilled Water.** The use of distilled water for all extractions to avoid the inorganic salts content of the finished malt sugar is essential. The soluble mineral matter natural to all commercial water supplies is found as a contaminant in the finished malt sugar unless removed by previous distillation. The ash content of corn flour and malt —and even commercial starch—is partly soluble and cannot be eliminated, although subsequent treatment does remove the heavy metal ions.

Evaporator condensate is the most logical source of distilled water. It is not of sufficient amount, because only the condensate in the calandria of the second and third effects may be used, but on account of the entrainment of a small amount of sugar, this condensate must be used before any acidity is developed by bacterial fermentation. The make-up water necessary must be furnished by distillation in the triple-effect evaporators.

3. **Green Malt.** The use of green malt in the conversion of the gelatinized starch contributes to an improvement in quality and cost reduction. Green malt is sprouted but unkilned barley. Because of its higher diastatic activity, it is less expensive than commercial dry malt and imparts no color to the solution during conversion. Kilning caramelizes the maltose in commercial malt, and this color is readily extracted during conversion and is difficult to remove with bone char.

Use of green malt, together with the atmospheric gelatinization, practically eliminates the necessity for decolorizing treatment. However, together with the higher diastatic power, it has correspondingly higher proteolytic activity which increases the partly soluble protein matter. This may largely be removed, as described later.

4. **Decolorization.** Because heating maltose solutions — especially when nearly neutral—partially caramelizes the maltose, decolorizing by means of bone char or activated carbon becomes a necessity if white malt sugar is desired. Ordinarily, the partially concentrated second filtrate is percolated through bone char, a practice adopted from cane and beet sugar refining. The disadvantages of a char plant are: It is expensive to build; it is expensive to operate, since after use the char must be dried, burned or kilned at high temperature, and occasionally rescreened; and it requires handling one ton of char per ton of sugar produced. Furthermore, the large amount of sweet water from washing out the char not only necessitates evaporation of a large volume of water to recover the sugar, but carries with it considerable of the color the char had extracted from the more concentrated sugar solution, as well as dissolved inorganic salts.

More effective and much less cumbersome in operation is the use of the more modern and highly developed activated vegetable carbons. The solution containing the maltose and dextrine is heated with one to two percent of the carbon (based on the weight of the malt sugar in solution) for a short time, then filtered.

True, the activated carbon must frequently by rejuvenated by treatment with dilute hydrochloric acid and occasionally burned in the absence of oxygen, but the cost of its use, it efficiency and the less complicated manipulation are decidedly in its favor.

5. **Calcium Salts.** In the preparation of boiled-milk feeding mixtures involving the addition of commercial dextrine-maltose sugars, coagulation of the milk protein frequently occurs, largely because of the calcium salts present. Commercial water supplies carry enough calcium salts so that when they are concentrated in the finished maltose-dextrine they are sufficient to effect this coagulation. Their removal may be achieved by filtration through artificial zeolites precisely as in commercial water softening. The dilute solution of dextrine and maltose is so treated just before final evaporation. Percolation through artificial zeolites replaces the heavy metal ions with sodium ions, which, although they do not influence the precipitation of the milk proteins, remain as extraneous contaminants in the finished malt sugar.

6. **Refrigeration.** The most pronounced refinement made in the manufacture of dextrine-maltose is effected by refrigeration. The liquor from the second filtration and from the bright portions of the first filtration is pumped through a double-pipe counterflow cooler and then flows over a direct-expansion (ammonia) Baudelot cooler which reduces the temperature to approximately 35 deg. F. The solution is blended with other batches in glass-lined tanks at this temperature for at least 48 hours.

During this time practically all the soluble starch and some of the protein material are precipitated, and are removed by filtering while cold. Starch and protein, together with the inorganic salts, are serious adulterants in commercial maltose-dextrine sugars, and their effect when introduced in infant-feeding formulas may be highly undesirable.

It Takes a Well-Made Cheese To Meet Export Requirements

By J. C. MARQUARDT, New York State Agricultural Experiment Station, Geneva, N. Y.

If cheese is to withstand the rigors of an ocean voyage under unfavorable conditions, it must be a firm, low-moisture, quality product.

MORE than 50 years ago, when we were exporting Cheddar cheese to England, a demand for a firm, low-moisture, well-made cheese developed. The English desired this type of cheese, and besides it was more suitable for shipping than softer cheese with a higher moisture content. Then, for many years we did not send cheese to England, and gradually there developed a domestic market for softer, rapid curing cheese.

Today we are again confronted with the need for making a firm, low-moisture export-type cheese, for reasons other than the preference of the English. This cheese must be shipped under unfavorable conditions. If it is slightly weak bodied, if it has traces of gas holes, it will deteriorate badly when exposed to high temperatures for prolonged periods.

High-quality milk and excellent workmanship are required in making this type of cheese. The percentage of starter added should be low, in most cases less than 1 percent. Suitable acid development in the milk requires a period of 45 to 60 minutes.

After cutting, the curd should be cooked slowly. The period of holding the curd in the whey should be ample to give a definitely firm curd. Matting should continue as long as working conditions permit to get the proper hot-iron value, or an acidity in the whey greater than 0.5 percent and less than 0.6 percent.

If, after milling, the curd still lacks the proper firmness, the milled curd should be forked and held for 30 minutes to 1 hour before salting.

Although the legal requirements allow 39 percent of moisture in cheese, a proper cheese for exporting has only 37 percent of moisture. Many experts feel that cheeses with a moisture range of 36 to 38 percent are suitable, and our experiments have shown that there is no special advantage in making a cheese with less than 35 percent of moisture.

Export cheese should contain a minimum of 1.5 percent of salt and a maximum of 1.7 percent. Cheeses with less than 1.2 percent of salt are very undesirable for export purposes.

Export-type cheese should have a firm body, be free from gas holes and have a clean flavor. These qualities, along with a good finish and color, are essential.

Normally, the gas generated by gas-producing bacteria is quite minor when compared to the total volume of gas developed by a curing cheese. The gas of the "gas hole" type, however, is always associated with bulging cheese when the cheese is exposed to high temperature. This is paradoxical, as practically all of the gas produced is carbon dioxide, not associated with the gas holes. Nevertheless, the appearance of the holes is always a sign of a cheese not suitable for high temperatures or long curing.

The loss of weight in Cheddar cheese before it is paraffined and during the curing procedure is an uncertain factor in the cheese industry. The loss will decrease as the moisture content decreases from the legal maximum of 39 percent.

The losses of moisture by Cheddar cheese before it is paraffined are due to evaporation and chemical changes. Both are greatly influenced by the temperature and humidity. This is indicated by the data in Table I. The loss is difficult to control, as a rather low humidity is desired to prepare the cheese surface for paraffining.

After the cheeses are paraffined the losses in weight are rather constant, as shown by the data in Table II. Although these values in Tables I and II can be regarded as satisfactory in a general way, they do not apply specifically to all cases. When the losses experienced both before and after paraffining are desired for a specific plant, the values should actually be determined for the type and size of cheese which is being made.

Export-type cheese when used in this country generally has an average moisture percentage of 37. When properly aged or "force cured," this type of cheese makes a delectable product.

USDA Photo by Forsythe

Cheese made in the United States goes down into the hold of a ship that will take it to England.

TABLE I—Percentage Loss of Weight, Before Paraffining, for Cheese Held at Various Temperatures.

Temp. (deg. F.)	3 days	6 days	12 days
40.....	0.3–1.5	0.3–1.5	0.4–2.0
50.....	0.3–1.5	0.4–2.0	0.5–2.5
60.....	0.4–2.0	0.6–3.5	0.8–4.7
70.....	0.5–2.5	0.7–4.0	0.9–5.5

TABLE II—Percentage Loss of Weight* of Paraffined Cheese During Curing at Different Temperatures.

Temp. (deg. F.)	2 months	4 months	8 months
28–30.....	0.0	0.2	1.0
32–36.....	0.5	0.8	1.5
38–40.....	0.5	1.0	2.0

* Moisture loss and slight weight loss as a result of products of curing.

Concentrating Citrus Juices By the Vacuum Method

By J. L. HEID, Senior Chemist, Agricultural Chemical Research Division, Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

PART II*—Control, sanitation, packaging and costs are discussed in the concluding part of this article. The first part, which discussed the selection of fruit and its processing, appeared in "Food Industries" for May, 1943.

THE value of citrus concentrates is based upon: (1) Ascorbic acid content, expressed in milligrams per gram; (2) anhydrous citric acid; expressed in percent by weight; (3) soluble solids estimated from: (a) the refractive index, or (b) the specific gravity expressed in degrees Brix; (4) flavor, color, texture and keeping quality.

The Association of Official Agricultural Chemists method for determining soluble solids is by drying in a vacuum oven at 70 deg. C. (158 deg. F.). Obviously, such a method is not adapted to plant control. Experience with various citrus fruits enables the vacuum pan operator to use a refractometer in effectively controlling the removal of concentrates from the evaporator. Tables have been prepared showing the refractive index of cane-sugar solutions of any concentration. In order to obviate the need for reference to tables, refractometers have been calibrated so that the percentage of sugar in pure sucrose sirups may be read directly at a standard temperature; and corrections may be applied if the temperature varies from that for which the instrument was calibrated.

Table I shows typical analyses of citrus juices. It will be noted that sugar constitutes 23 to 71 percent of the total solids present in these juices. Solutions of the other juice constituents have refractive indexes and specific gravities which vary from those of pure sugar solutions.

As the sale of orange and grapefruit concentrates has been based upon density expressed in terms of degrees Brix, it is necessary to determine or estimate this property of the concentrate. At concentrations above 50 deg. Brix, orange and grapefruit juices become too viscous for accurate determination of the specific gravity by means of a spindle hydrometer or by a Westphal balance. Dilution is an unreliable method for estimating the Brix because no tables are available for determining the relation of dilution to density on such complex mixtures as citrus juices. In order to arrive at a practicable basis for operation, Stevens and Baier[3] have published tables based upon a study of prepared mixtures of water, sugar and citric acid, and have determined the relation between specific gravity, refractive index, and soluble solids. These tables are useful for orange and grapefruit concentrates in the range of from 60 to 70 percent of soluble solids. They are less applicable to concentrates above 70 percent of soluble solids, and they do not apply to lemon and lime juice concentrates. Fortunately, the specific gravity of lemon and lime juice concentrates at 30 percent citric acid content, can be measured directly by spindle or Westphal balance without dilution; and each concentrator can easily prepare his own tables for correcting refractometer readings.

A convenient method for estimating the ascorbic acid content of fresh citrus juices and concentrates is described by Stevens[4]. Iodine titration may not be used in juices containing sulphur dioxide, or in the presence of metallic salts such as may be dissolved from cans during storage, but is inexpensive and convenient for routine plant-control tests of fresh juice and concentrates.

For accurate checking of ascorbic acid content, dependence is placed upon titration with 2.6-dichlorophenolindophenol in the presence of metaphosphoric acid and glacial acetic acid, employing a modification of methods

TABLE I—Analyses of Citrus Juices by A. O. A. C. Methods

Constituents	Fruit		
	Orange (percent)	Lemon (percent)	Grapefruit (percent)
Sugars	8.4	2.2	7.2
Acid (as citric)	1.1	5.3	1.4
Fat	0.2	0.3	0.2
Protein (N. x 6.25)	0.7	0.6	0.6
Ash	0.5	0.5	0.5
Other solids	0.9	0.6	0.6
Total solids	11.8	9.5	10.5
Sugar, Percentage of total solids	71.2	23.2	68.6

NOTE: The composition of citrus fruits changes with ripeness, variety, growing conditions, etc. These analyses were selected from the writer's notes as typical.

TABLE II—Weight per Gallon of Liquids of Varying Density.

Degrees Brix	Degrees Baumé	Specific gravity	Weight, lb./gal.
0	0	1.0000	8.33
1.9	1	1.0069	8.38
3.8	2	1.0139	8.46
5.5	3	1.0211	8.51
7.0	4	1.0283	8.56
9.1	5	1.0357	8.63
10.8	6	1.0431	8.69
12.6	7	1.0507	8.75
14.3	8	1.0583	8.81
16.1	9	1.0661	8.88
17.9	10	1.0740	8.94
19.8	11	1.0820	9.01
21.6	12	1.0902	9.09
23.3	13	1.0984	9.15
25.1	14	1.1068	9.21
27.0	15	1.1153	9.29
28.9	16	1.1240	9.36
30.6	17	1.1328	9.43
32.5	18	1.1417	9.51
34.2	19	1.1507	9.59
36.4	20	1.1600	9.67
38.2	21	1.1693	9.74
40.1	22	1.1788	9.81
41.9	23	1.1885	9.90
43.8	24	1.1983	9.99
45.7	25	1.2083	10.07
47.6	26	1.2184	10.16
49.5	27	1.2288	10.24
51.4	28	1.2393	10.32
53.3	29	1.2500	10.41
55.2	30	1.2608	10.50
57.1	31	1.2719	10.59
59.1	32	1.2831	10.69
61.0	33	1.2946	10.78
63.0	34	1.3063	10.84
64.9	35	1.3181	10.98
66.9	36	1.3302	11.09
68.9	37	1.3425	11.18
70.9	38	1.3551	11.29
72.9	39	1.3679	11.39
74.9	40	1.3809	11.51
76.9	41	1.3942	11.61
79.3	42	1.4077	11.72
81.8	43	1.4215	11.84
83.4	44	1.4356	11.96
85.8	45	1.4500	12.08
88.7	46	1.4646	12.21

NOTE: In the case of pure sucrose solutions, the Brix is the same as the soluble solids. In the case of citrus juices, this is not true.

*Agricultural Chemical Research Division Contribution No. 97.

described by Musulin and King[5], Bessey[6] and Morrel[7], using pure ascorbic acid for standardization of the dye.

When losses in excess of 10 percent of ascorbic acid are encountered, faulty plant procedure should be sought and corrected. These losses may be caused by:

1. Oxidation of ascorbic acid during heating or storage of the juice while in contact with atmospheric oxygen incorporated during extraction, screening or handling.

2. Oxidation of ascorbic acid following inefficient deaeration, when attempts are made to operate deaerators at a vacuum less than 27 in. or on larger volumes of juice than the equipment can efficiently deaerate. In general, the higher the vacuum and the greater the agitation of the juice, the greater the efficiency and capacity of the deaerators.

3. Dissolved copper salts materially accelerate the oxidation of ascorbic acid. Permitting the juice to come in contact with any copper alloy, with zinc, or with plain iron equipment will cause avoidable losses of ascorbic acid.

4. The action of living microorganisms may cause losses of ascorbic acid. The remedy lies in improved sorting of fruit and better plant sanitation. Losses from this cause may be considered as warning of a hazard of spoilage of concentrates.

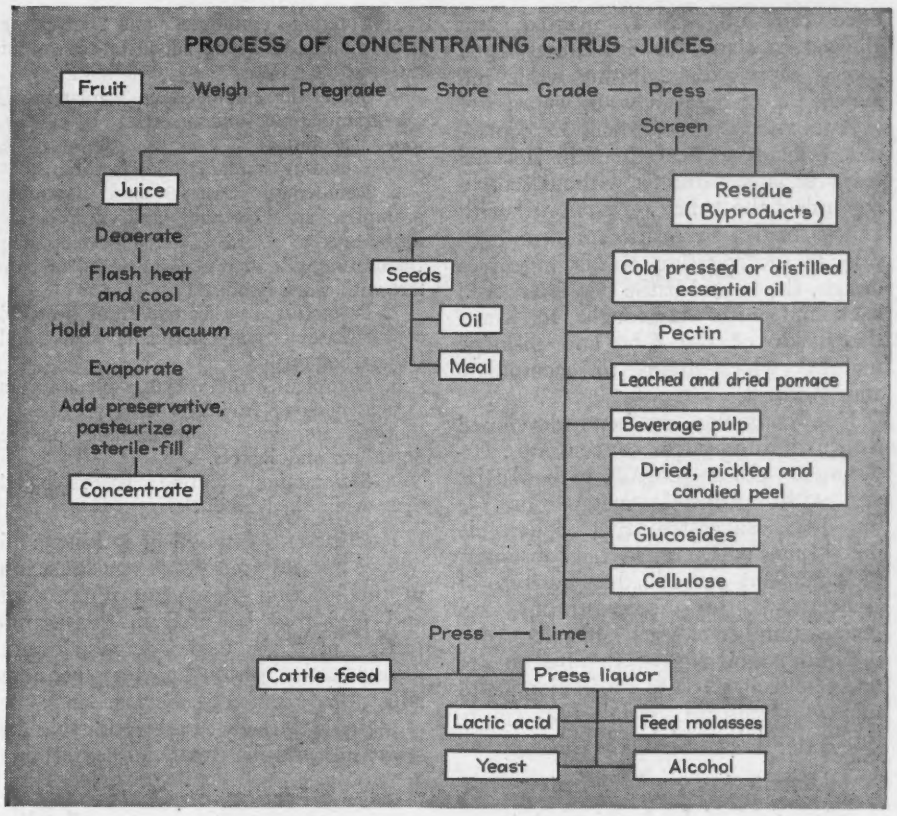
Complete laboratory records should be maintained on each batch or day's production. Yields of single-strength juice are expressed in gallons per ton of fruit, and yields of concentrate are calculated from the number of gallons of single-strength juice required to produce each gallon of concentrate. This ratio varies not as the Brix values or percentages of soluble solids, but inversely as the weight of soluble solids in each gallon of the initial and final product.

Table II shows the relation of the weight per gallon of sirup, juice or concentrate to the specific gravity and Brix. By reference to the weight per gallon, it is possible to estimate the weight of soluble solids in each gallon of juice or concentrate, provided the Brix is assumed to equal the percentage of soluble solids. The error resulting from this assumption is small, less than the normal shrinkage in processing.

If A is the percentage of soluble solids (Brix), B is the weight per gallon of juice or concentrate, and C is the weight of soluble solids per gallon, then

$$A \times B = C.$$

To illustrate, concentrating lemon juice form 9 deg. Brix to 46 deg. Brix (30 percent citric acid by weight):



0.09 x 8.6 = 0.774 lb. of solids in each gallon of single-strength juice;

0.46 x 10.1 = 4.646 lb. of solids per gallon of concentrate.

Then the necessary concentration ratio is found by dividing 4.646 by 0.77, or 6.034 gal. of single-strength juice will be required for each gallon of concentrate, without allowance for shrinkage or waste.

When orange juice is concentrated to 65 deg. Brix, 1 gal. of orange juice at 11 deg. Brix, weighing 8.7 lb., will contain 0.96 lb. of soluble solids. Each gallon of 65 deg. Brix concentrate weighing 11.0 lb. will contain approximately 7.25 lb. of solids. Therefore, approximately 7.43 gal. of single-strength juice will be required per gallon of concentrate without allowance for waste.

Packing and Storing

Citrus concentrates containing more than 20 percent of moisture and less than 15 percent of citric acid are perishable foods. Fermentation may be prevented by cold storage, by added chemical preservative, or by sterilization and sealing in tight containers.

In some plants, concentrates are filled in containers in a separate room to prevent excessive contamination by spoilage organisms.

New, waxed, fir barrels with oak bung staves have been commonly used for storage at 32 deg. F. If citrus concentrates containing high percentages of sugar and acid are manufactured and barreled under sanitary conditions, 0.1 percent of sodium benzoate will effectively inhibit fermentation in 40 deg. F. storage. The preservative is dissolved in a minimum quantity of water and added to the concentrate before removal from the vacuum pan to permit thorough mixing without aeration.

For storage of concentrates in barrels at ordinary temperatures, from 700 to 1,000 parts per million of sulphur dioxide may be added to inhibit fermentation and at the same time retard darkening and loss of vitamin C. Before the concentrates are used, the uncombined sulphur dioxide can be substantially removed by returning the concentrate to the vacuum pan and boiling for a few minutes under a high vacuum.

Pasteurized concentrates, without preservatives, have been packed in tin and glass containers. The flash pasteurization of high solids concentrates presents special problems because of viscosity. A simple method for heating the material without special equipment is to lower the vacuum in the concentrator sufficiently to permit raising the temperature to 165 deg. F., then pumping out directly to a filler. Bottom fillers are preferable and containers are

filled brim-full, sealed, inverted, and allowed to stand for 5 minutes, then cooled rapidly by agitating while immersed in, or sprayed with, water.

After viscous concentrates are cooled, it is difficult to heat them in jacketed tubes of large diameter without scorching unless the tubes are equipped with helical baffles to insure uniform high velocity and agitation. In one ingenious design, the helical baffle may be moved back and forth occasionally to scrape the inside of the tube and dislodge material which tends to accumulate and overheat.

New containers are being developed for distributing citrus concentrates. Experiments are in progress with plastics and with collapsible metal tubes. It has been suggested that collapsible metal tubes will permit retail consumers to press out prescribed quantities of concentrates for reconstituting any desired number of glasses of juice, with minimum exposure of the balance of the concentrates to oxidation and spoilage organisms. Metal from empty tubes could be reclaimed.

Sanitation and Cleaning

In no field of food manufacture are cleanliness and sanitation more important to profitable operation than in the preparation of citrus concentrates. Preservation is contingent upon protection against contamination by spoilage organisms.

Immediately after suspending plant operations, the system for handling juice and concentrate should be cleaned with hot caustic soda, trisodium phosphate or other effective cleaning solution, followed by thorough flushing with clean water to remove juice and detergents.

Stacks connecting vacuum pans and condensers accumulate traces of juice, and special care in cleaning with hot water and steam is necessary to avoid contamination of subsequently concentrated juice.

Immediately before resuming operation of the plant, water with 50 parts per million of active chlorine should be circulated throughout the entire system, followed by sufficient hot water to remove the chlorine. When operation is resumed, the first portion of juice circulated through the system may be wasted, which often justifies its cost.

Costly losses may be avoided by:

1. Designing a separate plant building or space to afford adequate protection from insects, dust or bacteria.
2. Arranging the interior of the plant so that equipment, walls and floors can be easily and completely cleaned with steam guns and alkaline detergents.
3. Training employees and delegating responsibility to insure adequate control of cleaning operations.
4. Subjecting employees to regular medical examinations and insisting upon personal cleanliness.
5. Providing sanitary toilet facilities.
6. Removing wastes and residues promptly, and cleaning and disinfecting waste bins to retard bacterial development (creosoting aids in protecting wood in contact with waste products).
7. Protecting new barrels from bacterial contamination, and sterilizing cans and bottles before use.
8. Completing the packing operation in a tightly closed room, where special precautions are exercised to exclude spoilage organisms and insects.
9. Maintaining routine bacteriological tests on finished products.

Facilities for disposal of residues and sewage are an important consideration in the location of a plant. Pulp, seed and peel may be used in the manufacture of feeds, feed molasses, humus fertilizer, alcohol, oils, pectin glucosides and other products. Sewage may be rendered relatively unobjectionable by screening and by yeast fermentation.

Production Costs

Citrus juice concentration is most efficiently conducted by 24-hour per day operation for 5 or 6 days per week, leaving the balance of the week for special clean-up and repair. Operated on such a basis, a plant with a capacity for handling 100 tons of fruit per day might expect production costs per gallon of 65 deg. Brix. orange concentrate to be approximately as follows:

This estimate is based upon average costs as follows:

Technical management and control	$0.050
Office and laboratory salary and expense	0.045
Insurance	0.012
Depreciation (buildings and equipment)	0.040
Taxes	0.030
Plant and manufacturing supplies	0.010
Repairs, replacements, maintenance	0.060
Labor	0.280
Power and light	0.028
Fuel	0.025
Water	0.020
Total	$0.600

Electric power: $0.0125 per kw.

Fuel: $0.02 per 100,000 B.t.u.

Water: $0.12 per thousand cubic feet. (Note: This price does not apply to condensing water, which is obtained from wells for the cost of pumping, or is recirculated after cooling in towers or spray ponds.)

This estimate does not include: Fruit, and fruit hauling (if separate); containers and labels; storage and shipping; sales and advertising; research and development; or miscellaneous expense.

Research and development, and miscellaneous expense may vary from $0.05 to $0.15 per gallon.

If essential oil is recovered from the peel, as it usually is, 10 percent of all production and fruit costs may be charged to the oil, and costs of each product may be computed separately. Because of fluctuations in peel oil prices, it is often more convenient to charge all production costs to concentrate, then deduct the market value of the oil from the original cost of the fruit in determining the total net cost of producing concentrate.

Uses of Citrus Concentrates

Until recently, the principal use of citrus concentrates has been in the manufacture of carbonated beverage bases, the most popular of which has been orange flavored. These drinks are intended as palatable thirst quenchers, and not as substitutes for pure fruit juices. Variations in formulas are trade secrets. The best are derived entirely from fruits excepting for minor constituents such as gums, stabilizers, color and salt. Typical combinations include: Orange, lemon, grapefruit and pineapple concentrates, decreasing in the order listed, to give rounded body and fruity character. To this mixture is added a gum-stabilized emulsion of a mixture of vacuum concentrated, cold pressed citrus oils which may be in the following proportion:

	Percent
Threefold-concentrated orange oil	90
Threefold-concentrated lemon oil	9
Fivefold-concentrated lime oil	1

A small quantity of pasteurized, screened juice from freshly crushed whole oranges may be added to restore freshness. Other constituents may include salt, preservative and artificial color. The bottler mixes 1 gal. of this base with 10 to 18 gal. of simple sirup. A measured "throw" is placed in bottles, which are then filled with carbonated water and capped. Carbonation ranges from 1½ to 2½ volumes of carbon dioxide.

Lemon and lime rickeys are also popular; and citrus concentrates are used in other flavors including root beer, ginger ale and colas. Carbonation of such beverages ranges up to four volumes of gas.

Other uses of citrus concentrates include the manufacture of frozen desserts, bread spreads, bakery goods (fruit cakes and cookies), cocktails, sauces and candies.

Drink stands and dairies have used blends of orange and lemon concentrates in the preparation of acceptable fruitades, but some of these products have been so poor in flavor as to curtail the volume of sales.

Interest is now focused upon the use

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Good Jams Can Be Made From SO_2 Treated Fruits

By J. G. WOODROOF and S. R. CECIL
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PART II*—Last month the authors discussed preservation of fruits in SO_2 solution. Here they tell how to use these fruits for jams and marmalades

JAMS and marmalades were made from peaches, strawberries and youngberries treated with sulphur dioxide solution and also from some of the same varieties which had been canned, frozen or dehydrated, and from fresh fruit.

In all cases the preserves were made with ¾ lb. of sugar for 1 lb. of fruit, with water added if necessary. The fruit, sugar and water were boiled for 30 minutes (or to 221 deg. F.). Covered white enamel boilers were heated on a sand bath, so that the heat was distributed evenly. Some batches were cooked in a steam-jacketed aluminum kettle. When cooking was completed, the preserves were sealed in sterile jars.

The purpose of this part of the study was not to develop formulas for making preserves and jam, but rather to determine what were the properties of the fruits after SO_2 treatment, and the suitability of the treated fruit for use under the conditions which are customary in this country.

Definitions and Standards

In Britain, according to Cronshaw,[1] a considerable proportion of the jam now made is from fruit preserved by the use of sulphurous acid or other sulphites. Depending on the variety, fruit must be from 35 to 45 percent of the finished product for full fruit standard jams and half that for "second quality" jams. The problem of removing the preservative from the fruit would be less where there is less fruit in the final product. The U. S. standard requires not less than 45 lb. of fruit to each 55 lb. of sugar or sugar and dextrose, in the finished product.

Fruit preserves and jams are defined by the U. S. Department of Agriculture[2] as: "The product made by cooking to a suitable consistency properly prepared fresh fruit, cold-pack fruit, canned fruit, or a mixture of two or all of these, with sugar or with sugar and dextrose, with or without water." Under this definition fruits preserved by sulphur dioxide solution could not be used for the manufacture of jams and preserves in the United States. However, the denial is by implication rather than through regulations and tolerances. Some states do prohibit sulphur dioxide in any food products with the exception of dried fruits.

Preserves from Sulphited Peaches

For processing tests peaches were selected which had a ripening season ranging from very early to late. These included both white and yellow flesh varieties, as well as freestones and clingstones.

Peaches suitable for jams and preserves are of firm, even-textured varieties which do not disintegrate or become fibrous on cooking. In the finished product the tissue should be translucent and the juice should remain fairly clear.

Of the varieties used, 11 were satisfactory, 3 were mediocre, and 3 were poor. Goldfinch was rated the highest, closely followed by Hale Haven, Sunbeam, Yellow Hiley, Elberta and J. H. Hale. The Uneeda, Golden Jubilee, Radiance and J. H. Hale peaches cooked to an objectionable, coarse, fibrous pulp, while the preserves from Honey, July Elberta and Rosebud were very unattractive because of turbidity in the juice. Preserves made from green Mayflower peaches were singularly jelly-like. Although the color was green, the transluscence was quite unusual and very pleasing. Preserves and jams from Rosebud, Radiance and Honey varieties were too dark in appearance, while those from Uneeda peaches were very light, almost colorless.

With Mayflower and Cumberland, both white-flesh varieties, a satisfactory appearance was obtained because of transluscence in the absence of yellow color. With the exception of these two,

Sample jars of preserves, representing more than 200 experimental lots made from SO_2 treated peaches, in combination with youngberries and strawberries.

* This article is based on a report published by the Georgia Agricultural Experiment Station as Paper 106, Journal Series; the project was sponsored jointly by the Commerce Department of the Tennessee Valley Authority and the Georgia Experiment Station.

all of the white flesh varieties produced jams and preserves of an undesirable grayish color. On the other hand, Golden Jubilee and July Elberta, yellow flesh varieties, yielded preserves poor in appearance due to lack of transluscence, although there were no undesirable colors present.

The specifications for peaches packed in the southern United States in 1941 and 1942 for Lend-Lease shipments to Britain required that they be heated with constant stirring immediately before placing in barrels. The reasons for heating are given as sterilization of the product to prevent spoilage before the sulphur dioxide solution penetrates, inactivation of enzymes which would remain active during storage and destroy flavor, color and texture of the product, and stabilization of the pectin so that it will jell more easily when made into preserves.

The effect of heating to 200 deg. F. immediately before placing the peaches in the barrels was tested for four varieties. In each case preserves from heated samples were more satisfactory.

Under commercial conditions peaches are heated in a large vat, run into 50-gal. barrels and allowed to cool very slowly. The chill of the barrel and of the 3 gal. of sulphur dioxide solution that is added bring the temperature of the peaches to 145 deg. F. within a few hours, and it is most probable that no enzymes are killed below this point.

In the laboratory, four varieties of peaches were cooled slowly in a steam-jacketed kettle, cooled moderately in about half as much time, and cooled quickly by being placed in small containers and put under refrigeration.

Products from slowly cooled peaches were rated first in three cases and second in the fourth, while those cooled quickly were poorest in all cases. The slowly cooled peaches gave jams and preserves which were pleasing in appearance, with more conspicuous fruit, better texture and color. There were no consistent differences in sweetness, acidity, tartness or fruity flavor, although these were generally poorer when the peaches were cooled quickly.

The use of unpeeled fruit, in another test, did not affect the appearance of the products except in those varieties in which the skin naturally slips easily. For these, the skin slipped off during the early stages of cooking and later rolled into an objectionable, tough, slightly darkened mass. In all varieties, the peel increased the chewiness of the product, the fruity flavor and tartness. Sweetness, acidity, color and conspicuousness of the fruit were the same for peeled and unpeeled fruits.

Calcium salts for firming made only slight improvement, if any, with the varieties of peaches tested.

The degree of ripeness at the time the peaches were processed influenced all the characteristics of the final products. This is the most important factor, next to selection of suitable varieties. Preserves from soft-ripe peaches were outstanding in appearance, sweetness, fruity flavor and attractive yellow color. Texture, tartness, acidity and tendency to jell were more pronounced with firm-ripe peaches. Green fruit gave products which were superior only in their ability to jell without added pectin.

Preserves from Frozen, Canned or Dehydrated Fruit

For comparison, frozen samples were prepared with 25 percent sugar added before freezing. Canned or hot-packed fruits were packed in medium sirup. The dehydrated peaches were peeled or unpeeled halves, treated with SO_2 gas for 30 minutes and dehydrated in a steam heated air blast cabinet for 20 hours.

A total of 17 varieties of peaches were made into jams and preserves, and 60 lots of the products were compared. Jams and preserves made from peaches treated with sulphur dioxide solution were superior in general appearance to those made with the canned or dehydrated fruit, and at least equal to those from frozen fruit. Frozen peaches usually retain the red color, may lose some yellow, and develop a slight brown color, all of which are carried over in the jams, and red may be present in objectionable amounts. In canning, all of the colors fade, completely or in part, and the resultant preserves have less total color. The appearance of the product made from dehydrated peaches is less attractive, due to brownish color and lack of translucence.

When peaches treated with sulphur dioxide solution are made into preserves, the yellow and green are restored but the red returns only partially, and there is no brown. The red is less brilliant than the original color and a slight grayishness may develop. If sufficient liquid is not maintained, a deep brown color may develop during removal of the SO_2 in cooking. The presence of copper will also produce a dark color.

Frozen peaches and sulphur dioxide treated peaches, unless firmed with calcium salts, were flabby and tended to cook to a mass. Dehydrated peaches were frequently too firm.

Jams and preserves of frozen peaches were superior to those made of canned or dehydrated peaches in appearance, fruity flavor, sweetness, acidity, tartness and color. The sulphur dioxide treated peaches always retain from 50 to 100 p.p.m. of SO_2, and this tends to accentuate the sweetness and tartness.

Strawberry Preserves

Preserves made from frozen strawberries were superior to those made from sulphur dioxide treated berries in appearance, acidity, fruity flavor, conspicuousness of the fruit, and in color. In every respect except in texture, preserves made from frozen berries were equal to those made from fresh untreated berries.

When fresh strawberries are treated with sulphur dioxide about half of the juice leaks out, until the shrunken berries float in their own juice. When made into preserves, the berries shrink to less than one-half of their original size. They regain most of the red color, but also develop a dull grayish color without luster. Some of the loss in quality of the preserves is due to the prolonged cooking required to expel the sulphur dioxide, and some of it is possibly due to a small amount (up to 50 p.p.m.) of residual sulphur dioxide left in the product. The amount left in the preserves is seldom enough to taste, but in excess of 50 p.p.m. imparts a "brassy" taste. This taste is distinct from either acidity or tartness, which are desired to balance the normal sweetness of the preserves. By adding calcium salts, preserves from sulphur dioxide treated strawberries may be made superior in texture to those from frozen fruit.

Strawberries break down in structure very easily under almost any form of processing; hence some firming agent must be used in order to obtain whole or partially whole berries in the finished preserves.

Preserves made from strawberries treated with calcium in the form of sulphate, monocalcium phosphate, and chloride had the most pleasing appearance, the most fruity flavor, and the most red color. Those salts producing firmness were the sulphate, chloride and carbonate. When no calcium was used the fruity flavor was outstanding. Sulphur dioxide is more easily removed when no firming agent is used.

Youngberry Preserves

Youngberries are especially well adapted to storage by freezing, canning or sulphur dioxide treatment. A maximum of the good qualities are carried over into the final products. All preserves made of this fruit were entirely satisfactory. All youngberry jams and preserves jell without added pectin. The preserves and jams made of canned youngberries were best, those made of frozen berries were second best, and

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Using Sugar to Best Advantage Under Rationing

By JAN MICKA, Research Department
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PART I—Cookie baker finds that available supply of sucrose goes farthest in high-grade products. Facts about the effects of different ingredients and methods and their relation to the amount of sugar required are presented

Doughs run on the rotary machine are of a composition and consistency that, when subjected to oven heat, permit retention of shape and size formed by a rotating die cylinder operating in combination with a corrugated feed roll.

WITH the rationing of sugar to food processors has come the need for getting the greatest possible tonnage of products made for the quantity of sugar available. This objective has double significance. First, the food processor has a peacetime production capacity that he wants to use as fully as possible under wartime conditions. Second, rationing of sugar to the consuming public has resulted in an increased demand for processed foods containing sweeteners.

Methods used to stretch the available supply of sucrose vary widely in respect to industries and to the character of products made in those industries. In the biscuit, cookie and cracker making industry, sucrose plays a dominant rôle, being second only to flour in ingredient importance. That fact is stressed because curtailment of the sucrose supply is directly reflected in the quantity of flour used as well as in the tonnage and quality of products made.

In the case of crackers, sucrose has possible use in the dough stage only to improve the color and bloom during baking, or in the sponge stage to increase gas production when flours used are deficient in gassing power. Its use to obtain the first result is detrimental, because the imparted sweetness is easily noticeable and undesirable in soda crackers. Addition to the sponge is objectionable because of a binding effect upon the sponge as well as a toughening effect upon the finished product.

For these purposes malt sirup can be, and is, used because malt sugar is less affected by yeast during fermentation,[1] gives an improved bloom during baking and does not impart the sweetness that sucrose does. Non-diastatic or diastatic malt sirup of 20 to 40 deg. Lintner, in the ratio of approximately 1 percent (based on flour weight), is usually added in the dough at the time the soda is added.

Sucrose is used in making sprayed crackers (not true crackers, which are made from unfermented doughs) in quantities of from 2½ to 7½ percent (based on the flour weight) for flavor and bloom purposes. Comparable results may be obtained by using invert sugar or malt sirup.

For the cookie baker, sucrose plays a different rôle. His chief concern is the appearance of the finished cookie. This appearance is dependent not only on the baking effect but also on the shape, size and weight of the cookies, which in turn govern the count per pound and the uniformity of pack in the cartons used. Sucrose has the unusual property, not possessed by such ingredients as flour and shortening, of affecting the "spread" of the cookie dough during baking. For that reason, the specific function of sucrose, as used by the cookie baker, is to give the desired spread and in that way control the shape, size and to some extent the weight of the finished cookies.

There is some leeway, however, in this function of sucrose. Combinations of certain types of flour and large quantities of shortening may be found to permit a reduction in the sucrose requirement. But in the absence of sucrose, even these combinations give no spread. In fact, a slight shrinkage results during baking. Because of its spread-control property, sucrose is used in various percentages, based on flour weight, to obtain adjustments in formulas. As shown in Table I, the percentages used may vary widely.

Sweetness that sucrose imparts to a cookie is of secondary importance to the baker, although a degree of sweetness is desired because of its effect upon the flavor of the cookie.

Temperature Is a Factor

Another function of sucrose in cookie doughs is to increase the mixing tolerance of the dough and, as a result, to prevent the doughs from becoming tough. Doughs must be mixed "hot" for products having a low sugar content—such as sprayed crackers, lunch milk biscuit, Army Field Ration C Unit B, and hard sweet cookies containing up to 30 percent sucrose (based on flour weight). The temperature of the water used is held at 180 to 200 deg. F. to assure that the doughs will run satisfactorily on the forming machine. A cool dough having a low sucrose content works up sticky and tough, with a marked decrease in elasticity and plasticity. When machined it does not retain the round shape formed by the cutter but deforms into an oval shape.

Table I shows that the average sucrose content of hard sweet cookies made from "hot" doughs is 23 percent, while that of the semihard sweet cookies made from "cool" doughs is 43 percent. What Table I does not show is that with the considerable decrease in sucrose content hot-dough products require a longer baking time and do not have the

TABLE I—Effect of Various Types of Cookie Machines, Coconut and Cocoa Powder on Sugar Requirements of Doughs

Test No.	Type of machine	Kind of cookie	Sucrose used[1] Minimum	Maximum	Usual fluctuation	Average	Invert sugar (on dry basis) (lb.)	Sucrose and invert sugar derived from molasses (lb.)	Total sugar based on 100 lb. of flour (lb.)	Relative percentage in formula Flour (percent)	Sugar (total) (percent)	Remarks
1	Wire-cut	Vanilla	63.8	84.2	66.3–76.5	71.4	4.6	....	76.02	39.40	32.10	Rich formula
2	Wire-cut	Vanilla	51.0	76.5	57.1–66.3	61.2	4.6	....	65.82	44.30	36.20	Lean formula
3	Wire-cut	Macaroon coconut	76.5	102.0	81.6–97.0	89.3	....	....	89.29	27.60	24.00	Rich formula, 160 lb. coconut[1]
4	Wire-cut	Macaroon coconut	40.8	61.2	45.9–57.1	51.0	23.0	....	73.98	37.10	31.20	Lean formula, 75 lb. coconut[1]
5	Wire-cut	Lemon	35.7	61.2	40.8–51.1	48.5	18.4	66.84	47.20	36.30		
6	Bar	Fig bar	25.5	51.0	30.6–45.9	38.8	9.2	....	47.45	59.40	27.30	In shell. With jam, relative percentage in formula is: Sugar 31.30%, figs 29.20%, flour 25.80%.
7	Bar	Coconut bar	40.8	61.2	45.9–57.1	51.0	23.0	11.4	85.20	35.80	32.20	Rich formula 100 lb. coconut[1]
8	Bar	Coconut bar	35.7	51.0	30.6–45.9	38.8	....	27.6	65.82	41.50	30.20	Lean formula, 75 lb. coconut[1]
9	Rotary	Short bread	40.8	45.9	30.6–40.8	35.7	4.6	....	40.31	53.10	23.80	
10	Rotary	Coconut short bread	30.6	40.8	30.6–40.8	35.7	6.1	....	41.84	52.80	21.90	20 to 45 lb. coconut[1]
11	Rotary	Base cake[2]	30.6	45.9	33.2–43.4	38.8	4.6	....	41.84	54.60	24.50	
12	Rotary	Chocolate base cake	35.7	51.0	40.8–51.0	45.9	7.2	....	53.06	46.40	27.60	20 to 30 lb. cocoa or 20 lb. cocoa and 10 lb. bitter chocolate[1]
13	Cutting	Semihard sweet	30.6	61.2	35.7–51.0	43.4	9.2	....	52.55	56.70	29.40	
14	Cutting	Semihard sweet molasses	25.5	38.8	28.6–33.2	30.6	....	20.4	51.02	55.50	27.80	
15	Cutting	Base cake[3]	30.6	51.0	33.2–43.4	38.8	13.8	....	52.04	56.90	29.10	
16	Cutting	Chocolate base cake[3]	35.7	57.1	40.8–51.0	45.9	13.8	....	59.69	49.20	30.50	20 to 30 lb. cocoa or 20 lb. cocoa and 10 lb bitter chocolate[1]
17	Cutting	Hard sweet	15.3	30.6	20.4–25.5	23.0	4.6	....	27.55	67.60	18.50	"Hot" dough
18	Cutting	Sprayed cracker	2.6	7.8	2.6–7.8	5.1	....	....	5.10	70.00	3.60	"Hot" dough
19	Cutting	Graham cracker	17.9	28.6	20.4–25.5	20.0	9.2	3.6	35.71	64.50	22.70	"Hot" dough

[1] Pounds per 100 lb. of flour. [2] For sandwich cookies. [3] For marshmallow cookies.

tender, superior eating qualities that the cool-dough cookies possess.

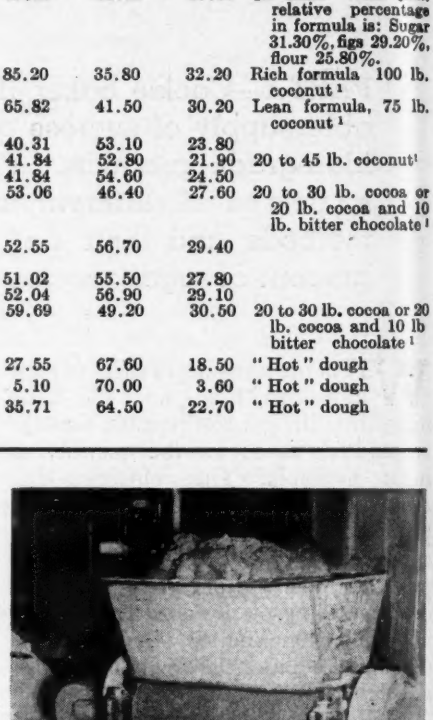
Effect on Machining Properties

To understand the reason for hot doughs in machining low-sucrose cookies, one must keep in mind that within certain limits cookie-dough formulas have to be balanced to work best on the machines being used. The percentage of sugar content plays an important part because of its relation to mixing procedure.

Reference to Table I shows that wire-cut and bar cookies require the most sucrose—as much as 89.29 percent (based on flour weight). Semihard sweet cookie doughs made on the cutting machine are next, with 43.23 percent, while short-bread cookie doughs made on a rotary machine require up to 35.72 percent sucrose. Contrasted with these are graham cracker and hard sweet cookie doughs made on cutting machines, which require 20 and 23 percent, respectively.

In those instances where sucrose does not supply all the sugars used, the total sugar content includes that from ingredients such as molasses, honey and invert sugar added to obtain sweetness and flavor. When invert sugar is used in quantities of from 4.6 to 18.4 percent on the dry basis, the sucrose content can be decreased approximately in proportion to the increase in invert sugar used. However, if invert sugar alone is used the cookies will not spread properly.

Table II shows to what degree cookies made on various machines spread or increase in size during baking. Vanilla wafers made on the wire-cut machine show the most spread. They double or more than double in diameter to give a count of from 85 to 120 per pound. Lemon and oatmeal cookies give a smaller spread of 64.81 and 60.0 percent, respectively, although still of good size. Coconut cookies have the smallest spread for wire-cut cookies but have a far greater spread than cookies made on the cutting and rotary machines.



Cookies made on the wire-cut machine (a type of cut-off depositor) are of the crisp wafer class that requires a dough of sufficient flow under the influence of bake-oven heat to spread to the desired shape and size.

Cookies made on the cutting machine are low in shortening, containing approximately 15 percent (based on flour weight). Consequently, the dough contains more flour for the sugar to spread (see Table I under Relative Percentage in Formula). On the other hand, cookies made on the rotary machine are "rich," with a high shortening content of approximately 30 percent (based on flour weight) but with less sugar and flour. Table II shows that the spread of cookies made on the cutting and rotary machines ranges from as low as 2.5 to as high as 12.12 percent.

TABLE II—Increase in Size (Spread) of Cookies Made on Various Machines.

Type of machine	Kind of cookie	Count per pound	Size of cookie (Diameter in inches) Before baking	After baking	Increase (spread) (percent)
Wire-cut	Vanilla	85	1	2	100.00
Wire-cut	Vanilla	120	26/32	1 22/32	107.69
Wire-cut	Lemon	28	1 22/32	2 25/32	64.81
Wire-cut	Oatmeal	26	1 28/32	3	60.00
Wire-cut	Coconut Macaroon	72	1 18/32	2 4/32	36.00
Cutting	Ginger	44	2 2/32	2 10/32	12.12
Cutting	Molasses	21	3 10/32	3 14/32	3.77
Cutting	Chocolate	56	2 16/32	2 18/32	2.50
Rotary	Short-bread	83	1 25/32	1 28/32	5.26
Rotary	Short-bread	38	2 8/32	2 12/32	5.56
Rotary	Short-bread	60	2 2/32	2 6/32	6.06

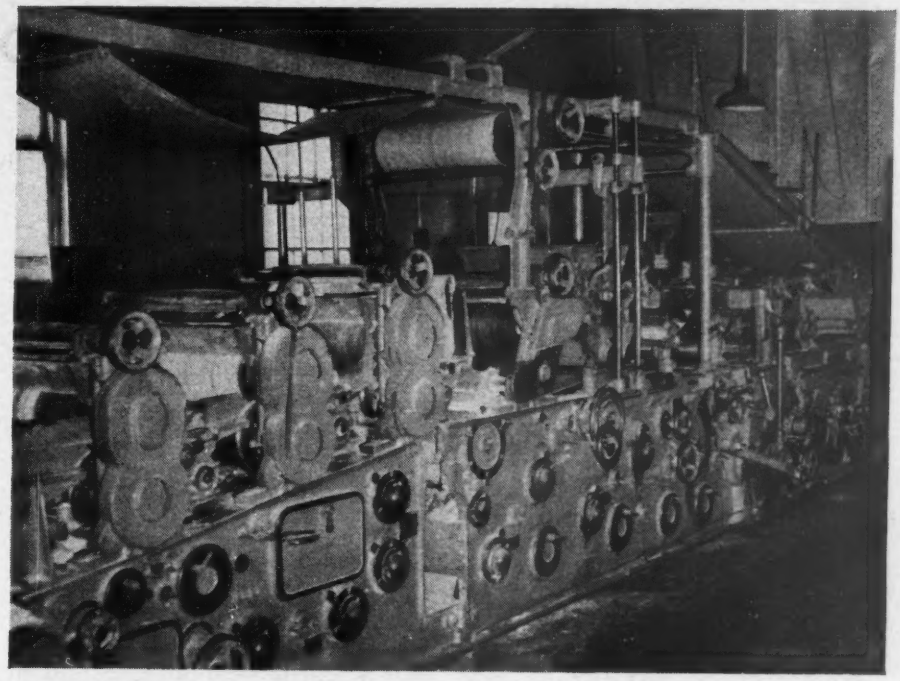
Bar cookies are similar in spread to the cookies made on the cutting machine.

Flour Cannot Be Disregarded

While the sucrose content of cookie doughs is of major importance to the baker, he also pays much attention to the selection of flours, especially for wire-cut cookies where the characteristics of the flour used show the greatest effect. For those cookies, "short," low-protein flours are preferred because the dough must be easily and smoothly cut by the wire on the machine to avoid deformation.

Use of soft, low-protein flours is economical not only because they require less sucrose in the doughs but also because the lower the sugar content the more tender is the finished cookie, provided the formula is well balanced. For that reason soft, low-protein flours are called "rich" flours.

The effect of protein content and the origin of the wheat as factors influencing the spread of the wire-cut cookies have been studied over a period of years. Michigan and the Pacific Coast produce wheats which usually have such a low protein content that the flours milled from these wheats are found to be satisfactory. The Michigan wheat crop of 1934, however, was exceptional.[2] Other states such as Illinois, Indiana, Missouri, New York and Ohio may have a limited supply of low-protein wheats, depending on the season. If the protein is sufficiently low, especially below 8 percent (Table III), these flours are as good for wire-cut pieces as Michigan or Pacific Coast flours. On the other hand, Michigan flours, even with the protein content as high as 9.10 percent (Table III, No. 3d), are good for wire-cut pieces because they do not possess the strength of Ohio or Missouri flours of the same protein content (Table III, Nos. 19, 23). While the sugar requirements of wire-cut cookie flours do not exactly follow this protein content, there is a relationship. If flours of approximately the same extraction (95 percent) are milled from good sound wheats, then the protein content, together with the knowledge of the origin of the wheat, is the most important single factor in determining the sugar requirements not only for wire-cut and bar doughs but also for the doughs made on the cutting and rotary machines. For wire-cut pieces the protein range is rather wide, as the flours with protein content as low as 7 and as high as 9 percent may be satisfactory; flours reaching these limits should be blended. Flours with protein content above 9.5 percent (Table III, No. 24) produce decidedly tough doughs even if only one-third is used in the blend.



Bar-forming and cutting machine is usually a combination unit with an automatic panning mechanism. Cookies made on this machine require a dough that will largely retain its mechanically formed shape and size during baking.

Effects of Coconut and Cocoa

In rich formulas containing large amounts of coconut (50 to 80 percent based on flour weight), sugar is increased as indicated in Table I; macaroon coconut with 89.29 and coconut bar with 85.20 percent are the highest in sugar. In lean formulas with coconut below 50 percent, sugar is not affected appreciably and practically is not changed if 25 lb. or less of coconut is used per 100 lb. of flour (Table I, No. 10).

Cocoa powder is used in the quantity

(*Turn to page 124*)

TABLE III—Effect of Flour on Sugar Requirements of Wire-cut (Vanilla Wafer) Doughs

Flour No.	Location of mill	Ash[1] (%)	Protein[1] (%)	Viscosity[2]	Sugar (lb. per 100 lb. of flour) (%)
1	Michigan	0.39	6.80	18	63.2[3]
2	Michigan	0.40	7.20	22	65.3
3	Michigan	0.39	7.50	24	66.3
4	Michigan	0.42	7.70	28	67.8
2a	Michigan	0.41	7.80	30	67.8
5	Michigan	0.40	8.00	35	70.4
6	Michigan	0.41	8.20	42	73.4
7	Michigan	0.38	8.20	46	75.0
2b	Michigan	0.41	8.30	34	71.4
3a	Michigan	0.39	8.30	38	72.4
3b	Michigan	0.38	8.40	48	76.5
7a	Michigan	0.42	8.50	41	73.4
2c	Michigan	0.41	8.60	38	72.4
3c	Michigan	0.41	8.70	34	71.9
2d	Michigan	0.42	8.90	42	73.9
3d	Michigan	0.42	9.10	38	75.5
8	Oregon	0.41	7.30	35	67.3
9	Oregon	0.42	7.40	36	68.3
10	Washington	0.40	6.70	21	62.7[3]
11	Washington	0.40	7.20	32	66.3
11a	Washington	0.41	7.30	36	67.8
11b	Washington	0.42	7.40	35	68.3
11c	Washington	0.42	7.50	36	68.8
12	Washington	0.44	8.20	42	72.9
13	Illinois	0.38	7.90	38	71.4
14	Illinois	0.41	8.40	48	75.0
14a	Illinois	0.42	8.70	54	77.5
15	Indiana	0.40	7.60	27	68.3
16	Indiana	0.40	8.40	45	73.9
17	Indiana	0.42	9.00	56	78.5
18	Ohio	0.41	7.80	32	68.3
18a	Ohio	0.41	8.10	38	72.9
19	Ohio	0.39	9.10	64	80.7
20	New York	0.39	8.20	45	73.4
21	New York	0.40	9.00	62	80.0
22	Missouri	0.40	8.20	48	75.0
23	Missouri	0.39	9.10	62	80.0
24	Missouri	0.39	9.70	112	84.2[4]

[1] Based on 13.50 percent moisture. [2] Based on 5 c.c. lactic acid by the MacMichael viscosimeter. [3] Gave tough dough. [4] Gave very tough dough. "a" to "d"— The same brand of flour but of different wheat crop.

U. S. Production of Oil of Dill

By ERNEST GUENTHER
Chief Research Chemist, Fritzsche Brothers, Inc., New York, N. Y.

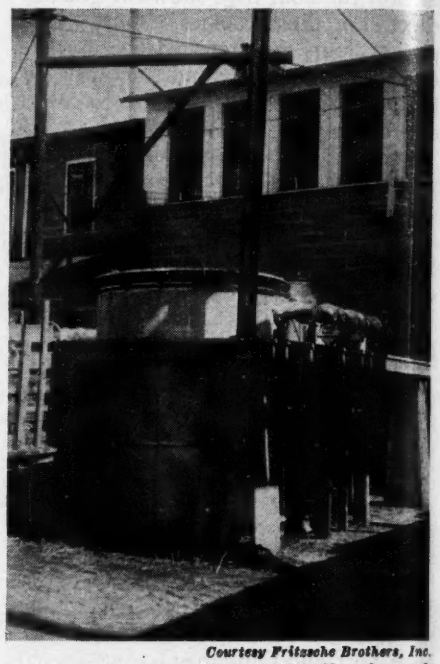
PART II—The physical and chemical properties of dill herb (weed) oil and dill seed oil, and the application of these products in food manufacture, are set forth in this article. In Part I, the growing of dill and the distillation of the oil were discussed

NUMEROUS samples and shipments of genuine dill weed oils analyzed by us during the last 15 years showed constants varying between the following limits:

Specific gravity at 15 deg. C.	0.871 to 0.905
Optical rotation	+85 deg. 41 min. to +113 deg. 20 min.
Refractive index at 20 deg. C.	1.4752 to 1.4859
Carvone content	8.0 to 45.7 percent
Solubility at 20 deg. C.	Soluble in 0.5 to 1.5 volumes and more of 90 percent alcohol. (Usually clear but occasionally with opalescence.)

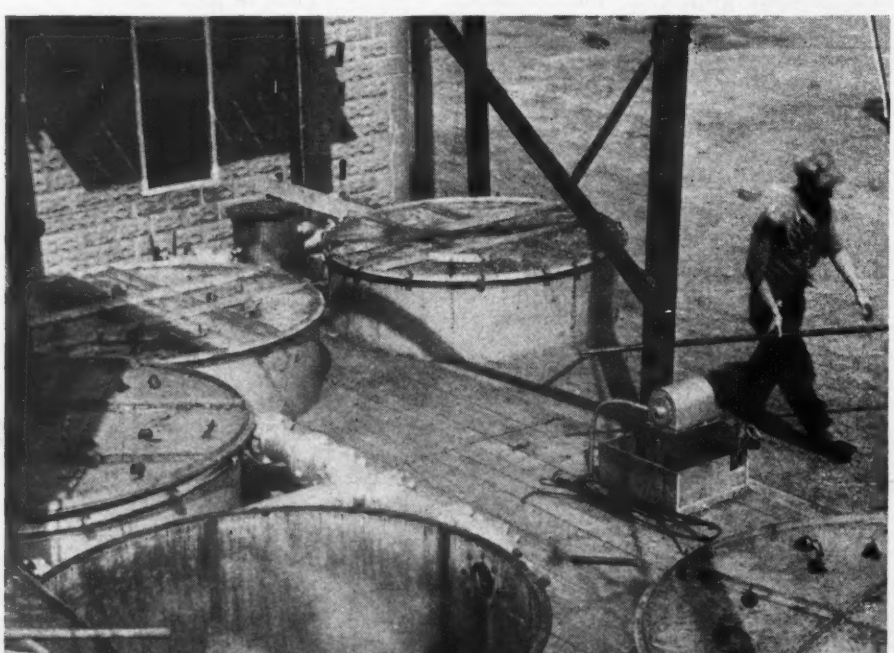
The wide variance between these limits is due to the fact that, in actual distillation, the ratio between seed and weed varies considerably. The more seed present in the distillation material, the higher the carvone content of the oil, the higher the gravity, and the lower the rotation. The properties of a dill oil depend upon the ratio between the content of phellandrene and carvone, which in turn depends upon the ratio of seed to weed in the distillation material; in other words, upon the state of maturity of the plant.

Our laboratories have also examined oils distilled from Indian seed and weed; these oils show a higher gravity and lower rotation in relation to the carvone content than the American or European oils. The abnormality is caused, most likely, by the presence of a larger amount of dill apiol in the Indian oils.



Courtesy Fritzsche Brothers, Inc.

Stills, each holding about 2,000 lb. of weed, are blown with steam for about 1½ hours.



Courtesy Fritzsche Brothers, Inc.

Part of the battery of stills used at one plant for producing dill herb (weed) oil showing interior of a still after charge is spent.

Physical and Chemical Properties of Dill Seed Oil

According to Gildemeister and Hoffman,[4] the constants of dill seed oil vary between the following limits:

Specific gravity at 15 deg. C.	0.895 to 0.915; in exceptional cases up to 0.917, mostly above 0.900.
Optical rotation	+70 deg. to +82 deg.
Refractive index at 20 deg. C.	1.484 to 1.491
Carvone content (Sodium sulphite method)	40 to 55 percent; seldom up to 60 percent. American distilled oils contain only 20 percent carvone but they are undoubtedly dill herb (weed) oils.
Solubility	Soluble in 4 to 9 volumes of 80 percent alcohol and more; in exceptional cases soluble in 1.5 to 2 volumes.

Chemical Composition of Dill Herb (Weed) Oil

The Schimmel chemists[5] identified the following compounds in oil distilled from dill herb:

d-a-phellandrene	The main constituent. α_D = +88 deg., 22 min.; d_{15}° = 0.8494; melting point of nitrite 109–113 deg. C.
Terpinene	Identified as nitrite, melting point 155–156 deg.; dihydrochloride, melting point 51–52 deg. C.; terpinene terpin, melting point 136–137 deg. C.
Limonene or dipentene	Melting point of cis-terpin hydrate 116–117 deg. C.
Carvone	Present in much smaller quantities than in the seed oil.
Dill apiol	Conversion into dill isoapiol, melting point 44–45 deg. C., also dill apiol acid, melting point 150–151 deg. C.

Isomyristicine....	Originally mistaken for dill isoapiol, this compound (melting point 44 deg. C.) finally proved to be isomyristicine $C_{11}H_{12}O_2$, which also occurs in oil mace; confirmation by mixed melting point. Oxidation with ozone and reductive splitting of the ozonide easily gave myristic aldehyde, melting point 131 deg. C.
Myristicine.....	The same investigators[5] identified in the fraction 126°/4 mm. (d_{20}° = 1.1442; $n_D^{20°}$ = 1.5407) myristicine $C_{11}H_{12}O_2$; confirmed by combustion analysis and melting point of dibromomyristicine dibromide 130 deg. C. In the high boiling fractions, a bluish compound and waxes, both not yet identified, were noticed.

Chemical Composition of Dill Seed Oil

Carvone.....	The main constituent, amounting to 40 to 60 percent of the oil, was identified by Gladstone[6] and by Beyer.[7] It is identical with the carvone occurring in caraway seed oil.
d-limonene.....	Was found by Wallach[8] as the principal terpene. It is present in the fraction 175–180 deg. C. and was identified as tetrabromide, melting point 104–105 deg. C.
Phellandrene.....	The Schimmel chemists[9] obtained a positive reaction with sodium nitrite and acetic acid glacial in an English oil, also in Spanish oils, i.e., in those dill oils which are distilled from the seed *and* herb. German oils, distilled exclusively from seed, gave a positive phellandrene reaction only if the first fraction was tested.
Paraffins.....	Occur in the fractions boiling above carvone. Crystallized from petrol ether, they melt at 64 deg. C.

Dill apiol (boiling point 285 deg. C.), which occurs in Indian seed oil (*Peucedanum sowa* Kurz), has not been found in European oils distilled exclusively from seed.[10]

Application of Dill Weed (Herb) Oil

The employment of dill weed oil produced from the whole herb has become increasingly extensive in the United States and Canada during recent years. At first, it was used primarily to flavor processed dills produced from salt stock, and in many cases it completely replaced the dill herb itself for that application. The lack of uniformity of flavor, obtained from the use of dill herb in so-called genuine dills, later prompted many manufacturers to supplement the herb with oil of dill weed in order to accentuate and standardize the flavor. This now constitutes a very regular practice, with an increasing tendency to depend more and more on the oil and less on the herb itself.

Fabian,[11] in the course of highly interesting investigations on the conservation of spices in food manufacture, found that dill herb actually absorbs some of the essential oils from some of the other spices (pimenta, cassia, bay leaves, mustard, celery seed, chili, peppers, cardamom and ginger root) employed for making dill pickles. The same author[11] demonstrated the great waste of essential oils when whole spices are used.

Since oil of dill weed is not particularly soluble in the acid brine used for dill pickles, it is very important for its successful employment that due steps be taken to insure as complete a solution as possible.

Courtesy Fritzsche Brothers, Inc.

Loading weed into a dill herb (weed) oil still. In loading, men inside the still pack the charge of dill weed evenly.

This involves first cutting or dissolving the oil with some neutral solvent, followed by the addition of this oil solution to the brine during vigorous and fairly prolonged agitation of the latter. Such agitation is frequently accomplished by means of a high-speed pump—for example, a centrifugal pump—which repeatedly circulates the brine in and out of the mixing tank. Another device consists of a high-speed electric mixer, the shaft of which is long enough so that the propellers come close to the bottom of the tank, insuring a complete circulation of the contents.

Only after the oil is completely dissolved in the brine is the latter used to cover the pickles.

For diluting the oil, alcohol is not uncommonly employed. This is sometimes replaced by glacial acetic acid. In other cases, the oil is reduced to 5 or 10 percent strength in the form of an emulsion, with gum tragacanth or other suitable emulsifying agent. A third device consists of absorbing the oil in some suitable dry medium such as salt or dextrose.

It has been stated that the oil—in other words, the flavor—will be absorbed more rapidly by the pickles if the brine is not previously acidified; in other words, if the acid be added to the flavored brine after the pickles have stood in it for some time. This is supposed to reduce the "slick" condition, which detracts from the physical appearance of the pickle. On the other hand, this soaking must not be too prolonged or the pickle may tend to become soft and lose its snap. The size and variety of the pickle, its condition when flavored, and other factors will necessitate a variation in treatment; the best conditions must be determined experimentally by the individual manufacturer.

This applies also to the proportion of oil employed. In general, 1 oz. of oil of dill weed, dissolved in 3 to 7 volumes of alcohol or similar solvent, supplies the flavor for a 45-gal, cask of dills containing, on the average, 17 to 20 gal. of liquor.

Oil of dill weed enjoys considerable application also in spice oil combinations designed for the seasoning of sweet and sour pickles, meat products, relishes and other condiments.

Employment of Dill Seed Oil

Dill seed oil used to be employed as a flavoring agent by the food industries before the introduction of the now more popular dill herb (weed) oil. Since then it has declined considerably in importance.

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Simple Technics Speed Training of Green Help

By JAMES F. HALE Bridgeton, N. J.

An accelerated training program for new employees can be developed through correct indoctrination and instruction by competent supervisors. Breaking down jobs into functions will replace "indispensable" men

EMPLOYEE relations are now more important than ever before. A correctly supervised program for new employees will save man-hours and curtail machinery breakdown, accidents and labor turnover. Careful study of jobs filled by "indispensable" men may make it possible to divide the jobs into component parts or functions which can be performed by less experienced help. Improvement of labor relations will result in increased efficiency in the war industries.

Many large manufacturing organizations have been carrying on work in employee induction and training for years. The smaller organizations have not paid much attention to this phase of operating, and from an economic viewpoint they may have been justified. Now it is apparent to those connected with all seasonal industries that if they are to operate at all during the coming season they will do so with much more green help than they had ever anticipated using.

Canners and other packers of seasonal crops have become accustomed in normal times to the greater part of their help returning each season for several years. These employees knew the routine and customs of the establishment; they knew the names of the supervisors and of other employees; they knew the various jobs and their aptitude for them. New employees were in the minority and they were assimilated readily into the group. We know from the past season's experience that we can expect the introduction into industry of many people who have never worked in factories. The effectiveness of this new group will depend on how well the employer does the job of inducting them into his plant and of acquainting them with the work.

Many of the operations in food plants are not so simple as they seem, as for example the inspection of products moving along a conveyor belt. So with the large number of new workers being hired under wartime conditions, especially in seasonal plants, an effective and speedy training program is needed to maintain the production rate.

What to Do

Start with the employment office; have a clean, dry, sheltered area with benches on which the employees can wait, if they must wait, before making their employment applications. Have adequate clerical help to get the necessary information from them. When the employee has been hired some introduction to the surroundings should be made. A card or booklet containing information for the new employee is a good method of presenting the rules governing personnel. Later on if a rule is broken, the new employee can be referred to the booklet.

As not everyone will take the trouble to read such material carefully, it must be presented orally if it is to be absorbed. Take each group of new employees and have someone explain the rules concerning discipline, the hours of work, the day and method of paying, the location of toilet facilities, the length of the meal time and the location of the eating place, and the time of relief periods. If the employees are unionized have a union representative explain the function and working of the union.

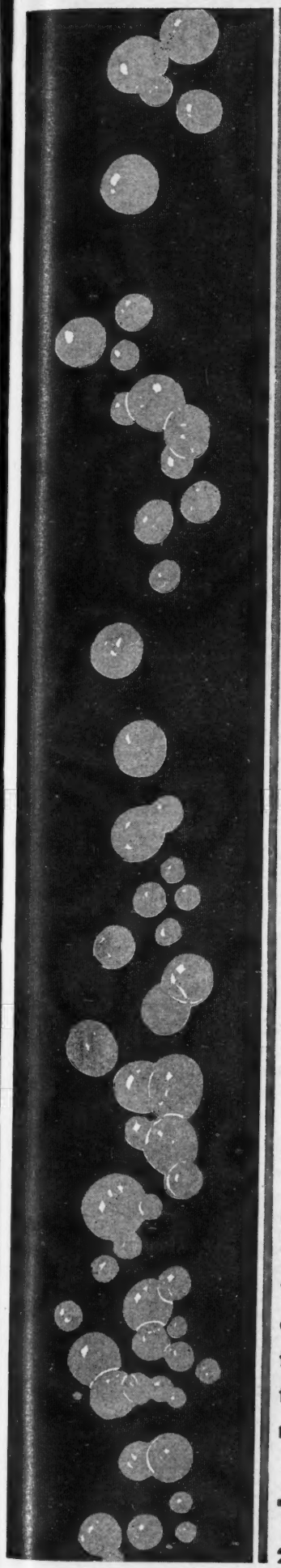
Then take the employees to the work place and have them introduced to the supervisor, so that they will know the name of the person for whom they are working. Insist that the supervisor know the first name of everyone working in his or her group.

Remember that the first few hours or even minutes that an employee is on your premises will have a great deal to do with his future attitude toward you and his work.

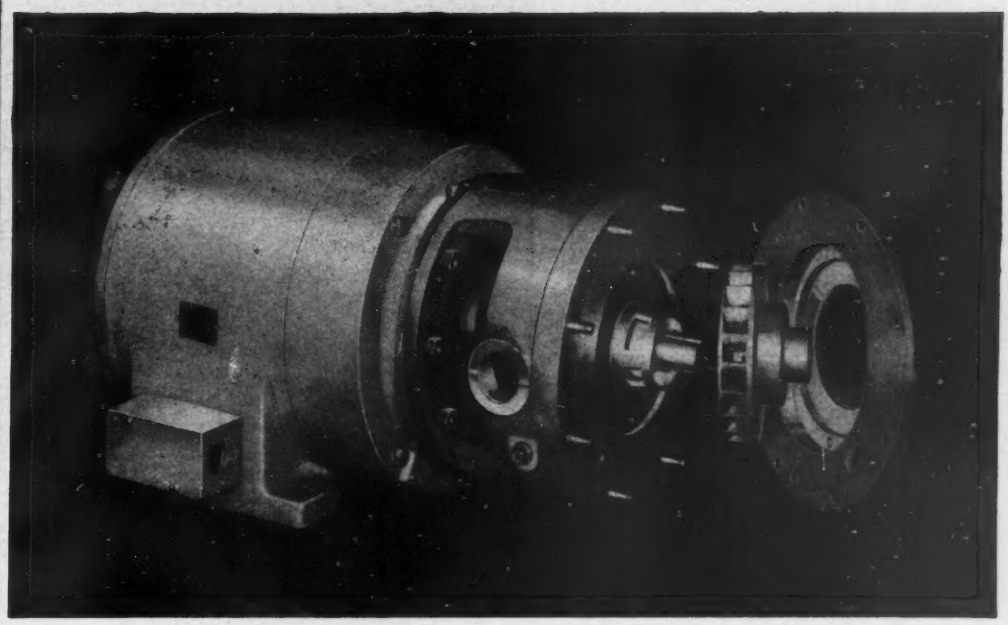
Such an introduction to the plant will do much to reduce the labor turnover. This is only part of the necessary job to be carried out. The other part of it is training and the benefits to be derived from that.

The attitude toward training generally is expressed among the work-level supervisors in terms such as these: "The other girls will show them" or "If he works in the gang, he'll learn." An organization may be able to get by with such an attitude during normal times when the proportion of experienced and highly skilled employees is large, but in wartime this policy may have dangerous consequences.

(Turn to page 109)



ONLY CLEAN AIR CAN REACH YOUR PRODUCT FROM A NASH COMPRESSOR



Here is a compressor designed perfectly to meet the needs of the Food Plants. It is simple, for it has only one moving part, a rotor cast in one piece and rotating in the casing without metallic contact. This means trouble-free operation over long periods. It is compact and requires little valuable floor space. Its oversize ball bearings seldom require attention or lubrication. No lubrication is required in the interior, so that the air is kept clean from the time it enters the pump. • But this is not all. The compressing medium in the Nash Pump is a rotating column of clean water. The air is in intimate contact with this water in passing thru the pump and is actually scrubbed while it is being compressed. Dust present in the atmosphere is removed, and the air delivered free from dirt, oil, or heat, without the use of scrubbers or air washers. Think what this means in terms of purchase cost and floor space occupied by complicated air washing apparatus. • These pumps are proving their worth in the most trying service. They are ideal for transferring beer or wort from tank to tank by air pressure, for maintaining pressure on aging tanks, for supplying compressed air to bottling machines in racking, etc. • Available in any capacity, these pumps deliver pressures up to 40 lbs. absolutely uniform without storage tanks. • You want the most reliable pumping equipment in your plant, so by all means find out more about the Hytor. Our catalog No. 217 is free on request.

THE NASH ENGINEERING COMPANY

243 WILSON ROAD • SOUTH NORWALK, CONNECTICUT

NEW PACKAGES & PRODUCTS

Closure for Glass Pack

"CELON SAFETY SEALS," practical and efficient new closures for glass pack, are manufactured by the Celon Co., Madison, Wis. The wartime closure is a cellulose Celon seal, used in combination with a paperboard cap with a specially treated lining, or a waxed paperboard disk.

Among companies using the Safety Seal are Peanut Products Co., Omaha, Neb., whose product is illustrated here, and several coffee firms who find that the cap successfully holds the vacuum. Coffee roasters can use present vacuum sealing equipment to apply the caps or disks, and the cellulose seals are applied with no equipment at all. After applying, the cellulose seal shrinks to fit the glass finish very tightly, completes the noncritical wartime closure, and lends brightness and appeal to an otherwise drab finish. The Safety Seals are made in a variety of colors, either transparent or opaque.

All-Fiber Coffee Can

DESIGNED to be manufactured and filled on existing equipment with minor machinery adjustments, an all-fiber coffee container has been developed by American Can Co. Three roasters, Newell & Truesdale, Binghamton, N. Y. ("New and True" brand coffee); Scandinavian House, N. Y. ("Sweden House" coffee); and William Boardman & Sons Co., Hartford, Conn. ("Putnam" coffee), are now packing in the new coffee can and report brisk acceptance on the part of consumers.

The new wartime container is compact, tough and light and weighs when filled only 1 lb., 2¼ oz. Virtually the same size as the vacuum-packed metal container, the can is protectively lined and is equipped with two closures, a shipping disk which is removed by the consumer and a friction plug or replaceable cap to close the can when not in use.

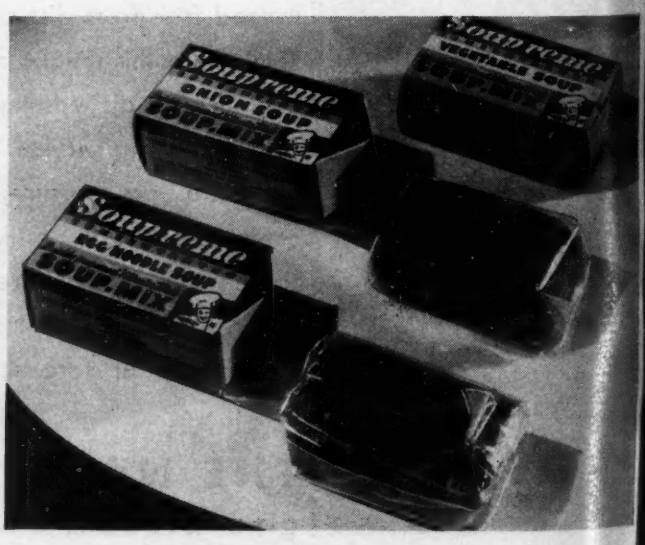
Dehydrated Soup Bricks

GOOD THINGS continue to come in small packages—for example the "Soupreme" concentrated soup mix packed for Western Food Co., Los Angeles, Calif. No bigger than a bar of candy, there's enough concentrated soup in one package to make one quart. The new dehydrated soup in bar form comes in onion, egg noodle and vegetable flavors and is wrapped in transparent "Lumarith," product of Celanese Celluloid Corp., which is waterproof, greaseproof and insect proof. The compressed bar is then packaged in a paperboard carton with informative labels.

Egg and Jelly Container

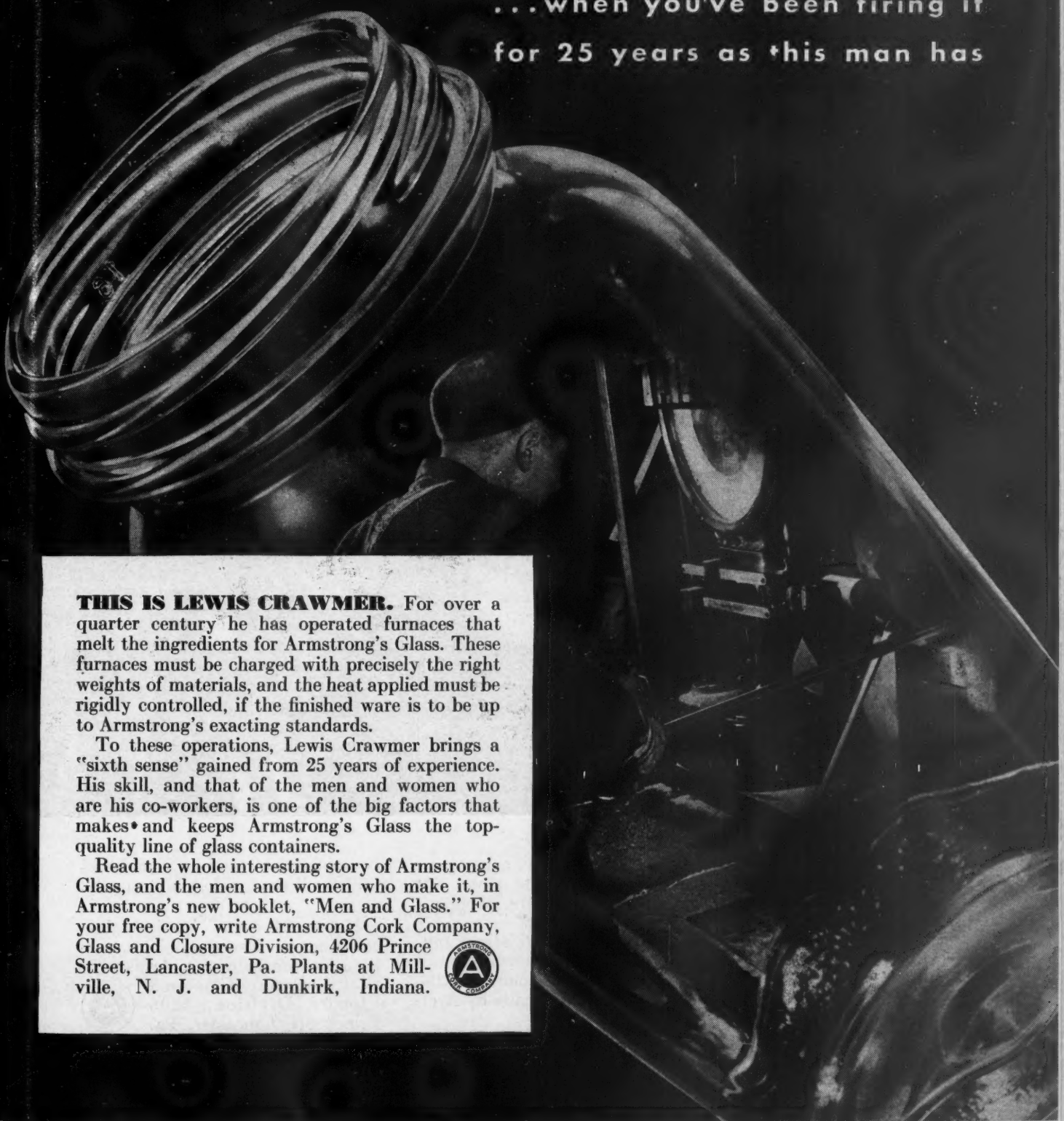
JOSEPH BUCHWALD Co., San Francisco, Calif., has solved wartime container difficulties with a double-purpose fiber carton which can be used interchangeably for frozen eggs or hot jelly, with different liners. The company's frozen eggs are reduced to temperatures of —40 deg. F. while in the package, and the jelly products are packed at a temperature of 220 deg. F.

The container consists of an outer carton of 275 test corrugated kraft board with an inner liner of Sylvania cellophane. In the case of the jelly container the liner is a duplex cellophane bag holding 40 lb. of jelly,



YOU GET A SIXTH SENSE ABOUT GLASS

...when you've been firing it for 25 years as this man has



THIS IS LEWIS CRAWMER. For over a quarter century he has operated furnaces that melt the ingredients for Armstrong's Glass. These furnaces must be charged with precisely the right weights of materials, and the heat applied must be rigidly controlled, if the finished ware is to be up to Armstrong's exacting standards.

To these operations, Lewis Crawmer brings a "sixth sense" gained from 25 years of experience. His skill, and that of the men and women who are his co-workers, is one of the big factors that makes and keeps Armstrong's Glass the top-quality line of glass containers.

Read the whole interesting story of Armstrong's Glass, and the men and women who make it, in Armstrong's new booklet, "Men and Glass." For your free copy, write Armstrong Cork Company, Glass and Closure Division, 4206 Prince Street, Lancaster, Pa. Plants at Millville, N. J. and Dunkirk, Indiana.

ARMSTRONG'S GLASS

and **ARMSTRONG'S CLOSURES**

HOW TO MAKE YOUR WARTIME PACKAGE A BETTER POINT-WINNER

NOW, more than ever, your packages have to stand out from others to win Mrs. Shopper's precious ration points.

Your packages will stand out, despite wartime standardization, if you use distinctive, colorful, lithographed metal caps made by Armstrong.

Lithographed Armstrong's Metal Caps offer you an effective, economical means of keeping your name or trade-mark alive for the duration—and afterwards.

For cap design suggestions without obligation, send us your package. We'll send a sketch promptly.

* * * *

If you have any wartime glass container or closure problems, perhaps we can help you. Armstrong Cork Company, Glass and Closure Division, 4206 Prince St., Lancaster, Pa.

The Army-Navy "E" flag, which flies over Armstrong's Lancaster Closure and Floor Division Plants, was awarded to the employees for excellence in the production of cartridge cases, shells, aircraft parts, camouflage netting, and many other vital war materials.

Armstrong's Closures

TURN STANDARD CONTAINERS INTO STANDOUT PACKAGES

which is poured hot from the cooking kettle into the container, where it jells. The same container has a special frozen-food cellophane liner used for the egg meats, which are poured in a liquid state and placed in the refrigerator to be frozen. The container and both types of liner are made by Moist-R-Proof Co., San Francisco, with a completely sealed seam at both the bottom and back of the bag.

Powdered Orange Juice

CALIFORNIA FOOD RESEARCH INSTITUTE, San Francisco, Calif., has developed a dehydrated orange powder which rehydrates into a juice tasting very much like the real thing. An improvement on most of the orange juice powders, which produce a "watery" beverage, this powder is reported to give the full flavor, body, color and vitamin C content of fresh orange juice. Dehydrated like blood plasma, (which is frozen and dried under vacuum) the powder will soon be produced commercially.

Packaged Malted Milk

NEW YORKERS are becoming familiar with Carnation brand malted milk in natural flavor, which recently appeared on the markets in this city. Product of the well-known Carnation Co., Milwaukee, Wis., the malted milk is a natural food prepared under sanitary conditions by combining pure milk with the liquid separated from a mash of ground barley malt and wheat, in such a manner as to secure the full enzymic action of the malt extract, and then dried under vacuum. Food values of all ingredients are retained, combined in particularly digestible form. The container is glass pack with a metal screw cap, packaged in a paperboard container in the Carnation colors, red and white.

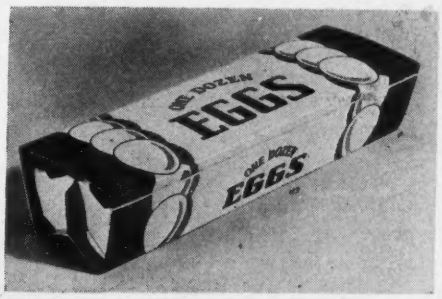
Pancakes from Soybeans

"GOLDEN SOY GRIDDLE CAKE MIX," product of Soy Food Mills, Chicago, Ill., is riding the crest of the popularity for soybean foods that is apparent in retail markets in the Midwest. Unbleached wheat flour, specially prepared soya product, dextrose, salt and baking powder are blended in this mix that

makes either griddle cakes or waffles. "Golden Soy" is marketed in a 1-lb., 4-oz. paperboard carton with a blue and yellow overwrap, and a label giving nutritional values.

No Eggs Broken

TO PROVIDE MAXIMUM protection for eggs during shipment, Sutherland Paper Co., Kalamazoo, Mich., has



brought out a new retail 2x6 cushion egg carton which combines improved protective features with sales appeal. The "Saf-Eg" carton is exceptionally sturdy, with a rigid center support extending the full length of the carton, and a double thickness reinforcing the front and rear walls. Extra strength at these vital points is particularly important when the cartons are stacked or packed in 30-doz. shipping cases. Several poultry houses, super markets and egg packers are using the Saf-Eg carton.

Yes, there is a single

INFORMATION CENTER

for data on EVERY type of Paper Package for any type of Food!

Because we can supply not just one or a few of available types of paper packages, but *every type*, we can give you the complete paper packagings picture and can make recommendations absolutely without bias. No matter whether it is packaging to government specifications or for civilian uses, we're able to help—and our unique service can save you weeks of "shopping" from source to source.

THE EASY AND QUICKEST WAY *to get samples, comparative data and prices on* all *the packages suitable for your purpose is to write us, giving*

1. *Description of the product to be packaged.*
2. *Size of package required — or — quantity to be contained in package.*
3. *Quantity of packages to be used, so that prices can be submitted.*

That's all you need do! We'll send portfolio of samples with all relevent information. And, there's no obligation.

Packaging Division
E. W. TWITCHELL Inc.
Public Ledger Bldg., Philadelphia, Pa.
Specialist in Special-Purpose Paper Packagings

To get your product in the nation's market basket today ...YOU NEED HIGH VITAMIN VALUES!

"The day will surely come when every food manufacturer will have his products literally picked apart, point by point, in determining their right to a place in the family market basket."

(FOOD MATERIALS "Guide to Enrichment", November, 1942)

That day has already arrived!

Right now there are two kinds of currency being used in buying many food products—money and points. And as your own wife can tell you, *points are by far the most important!*

As a result, America's housewives are shrewdly insisting on getting maximum nutritional value for each precious point they have.

No more haphazard buying on the home front! And none when Uncle Sam buys for the boys on the battle front. Today your products must justify their right to a place in the rationed family market basket . . . must justify their right to precious cargo space. And when the decisions are made, the word "Enriched" has a truly amazing effect—for everyone knows that "Enriched" means *improved!*

If your products don't measure up in vitamins—if they have lost vitamins in processing—somebody else's "Enriched" products may crowd yours out.

So give serious thought to enriching. Find out today which of your products, in the opinion of nutritional authorities, should be enriched. Then with vitamin enriching costs down to a mere fraction of what they used to be, go ahead and give your products the soundest possible nutritional foundation.

Do this not only to safeguard your present sales, but also to insure your after-the-war position.

Let us give you the latest technical information on how to enrich, the new low costs and the many benefits. We pioneered in vitamins and today are furnishing a goodly percentage of the nation's vitamin B_1, B_2 and C requirements. Write for these latest sales enriching facts today. Hoffmann-La Roche, Inc., Vitamin Division, Roche Park, Nutley, New Jersey.

FOOD INDUSTRY NEWS

GENERAL NEWS • TRENDS • MEN • JOBS • COMPANIES • JUNE, 1943

Enriched Cereal Standards Debated at FDA Hearing

Addition of vitamins and minerals to flour, bread and farina discussed by technologists

ENRICHMENT of cereal foods is sought by government spokesmen to improve the mineral and vitamin contents of the average diet. This effort furnished the basis for extended testimony and acrimonious cross-examination of witnesses at formal hearings of the Food and Drug Administration recently held in Washington. Special importance is attached to the proceedings because they were the first of any importance since the decision of the Supreme Court reestablishing farina standards and strongly supporting the authority of the Administrator.

The major changes in the standards proposed by the government were increases in the requirements for thiamin, niacin and riboflavin for flour, bread and farina. It was also proposed that the requirements for iron and calcium be raised for all three types of products, and that these enrichments be required instead of being optional. Only a minor modification of the vitamin D optional ingredient limits was suggested for bread. But a very large increase in vitamin D for farina was proposed, and this would be a required, not an optional ingredient, under the government suggestions.

Distinguished scientists spoke for the food and nutrition committees of National Research Council, including Dr. R. R. Williams and several of his committee associates. The Food Distribution Administration was represented by Dr. Russell Wilder and Dr. R. C. Sherwood. All of these gentlemen supported the government request with respect to vitamins and proposed limits for mineral components. But they did not support the government in the recommendation that calcium or vitamin D be made required ingredients. They clearly expressed a preference for retaining those additive materials on an optional basis.

Generally speaking, the flour milling industry accepted the proposed increased limits but opposed making calcium a required ingredient. Spokesmen for the American Baking Association took a similar stand with respect to bread standards.

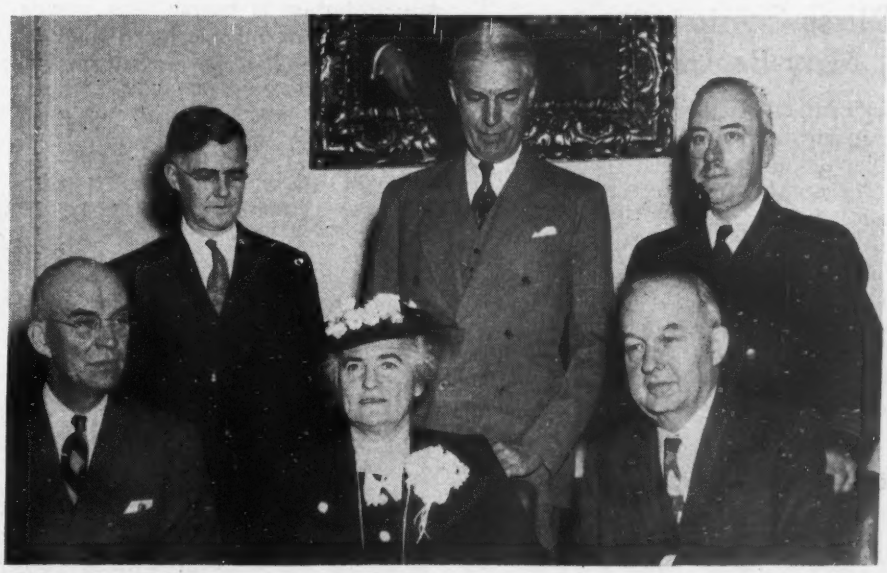
The farina standards proceedings were initiated by the comprehensive testimony of Professor Robert S. Harris, food and nutrition expert from Massachusetts Institute of Technology. He presented a comprehensive review of the scientific literature and recorded clinical experience with respect to each vitamin and mineral under consideration. He recommended that calcium and vitamin D be retained as optional ingredients. He favored the increased standards for the other vitamins as required ingredients. He opposed the very high calcium limits recommended by the government on the ground that they are unnecessary and technically impractical of realization. This latter point was strongly supported by other spokesmen of the industry who demonstrated that excessive calcium additions produce dusting out and segregation.

Dr. Harris also presented a comprehensive scientific summary of the nutritional requirements for iron of different age groups in the population. He pointed out that farina is frequently the only iron-carrying food available to infants during their first year of life. Adequately to prevent anemia in such infants much higher permissible iron content would be essential. One or two government men suggested their opposition to very high iron standards.

Briefs from interested parties were received by the presiding officer until June 1. Prompt action is expected giving tentative findings of fact, followed by proposed standards.

Clearing House Set Up For Dairy Equipment

AT THE REQUEST of the Food Distribution Administration, Dairy Industries Supply Association has undertaken a nationwide processors' campaign to bring in idle dairy industrial equipment. Because the used equipment lying idle in dairy plants throughout the country has become a national asset, DISA is systematically organizing a canvass and clearing house to round up the equipment.



THEY WENT TO FOOD CONFERENCE

These are the American delegates to the United Nations Food Conference which convened at Hot Springs, Va., on May 18. Left to right, seated, are Murray D. Lincoln, executive secretary of the Ohio Farm Bureau Federation; Miss Josephine Schain; and Marvin Jones, chairman. Standing are Paul H. Appleby, Undersecretary of Agriculture; W. L. Clayton, Assistant Secretary of Commerce; and Dr. Thomas Parran, Surgeon General, U. S. Public Health Service.

Revise Can Quota For Packers

Amendment to M-81 lists 13 food products that may now be packed in quota-free cans

WPB on April 27 increased the number and quantity of food products which can be packed in cans during 1943, amending M-81 at the request of the War Food Administration. The revised order adds 13 food products to the list of foods which may be packed in cans. It also provides for quota-free use of certain sizes of open-top sanitary cans now in the hands of can manufacturers or packers—for packing any food products permitted by the order—and quota-free use of certain sizes of open-top sanitary cans made from frozen tinplate now in the hands of can manufacturers.

The 13 additional products and the 1943 quotas which may be packed will be found on the following table:

Product	1943 Packing Quota
Soups	
Mushroom	Unlimited
Bean	75 per cent of 1942
Turtle	75 per cent of 1942
Red raspberries	100 per cent of 1942
Cherries, RSP frozen only	[1]50 per cent of 1942
Mixtures of vegetables	75 per cent of 1941
Mushrooms	[2]50 per cent of 1941-42
Okra	100 per cent of 1940
Tomatoes and okra	100 per cent of 1940
Ground fish	Unlimited
Turtle	Unlimited
Liquid modifications of milk	90 per cent of 1942
Pectin, liquid	Unlimited

[1] 50 per cent of total frozen tonnage packed in all containers during 1942.
[2] Crop year.

Glass Containers May Be UP 17 Percent

If manpower, transportation and an adequate supply of materials are available, production of glass containers in 1943 can be increased by almost 17 percent over that in 1942, according to the Glass Container Manufacturers Industry Advisory Committee. Granted adequate supplies, the committee estimated that 1943 production will be 92.5 million gross (13.3 billion containers) as compared with 79.1 million gross (11.3 billion containers) in 1942.

General Foods Buys Snider Packing Corp.

Snider Packing Corp.'s eight New York State plants, producing condiments, canned foods and frozen foods, have been acquired by General Foods Corp., subject to Snider stockholders' approval.

General Foods will issue 168,000 additional shares of common stock for the acquisition. The agreement calls for an exchange of common stock on the basis of four shares of General Foods for each five shares of Snider stock outstanding. Following the sale, Snider Corp. will be dissolved and the General Foods stock so received will be distributed to Snider stockholders.

For ten years Snider has been an important packer for Birds Eye Frosted Foods, General Foods' subsidiary.

Develops Method For Dehydrating Cheese

American Cheddar cheese can now be dehydrated for Lend-Lease shipments by a new method more direct than the commercial procedures currently in use. The new method will also release spray-drying equipment for drying other foods, according to the Agricultural Research Administration.

Dr. George P. Sanders of the Bureau of Dairy Industry, who devised the new method, found that if natural full-fat cheese is grated and then partly dried at room temperatures, the fat will be sealed up in the numerous case-hardened particles of curd. The particles can then be dehydrated in a tunnel drier or by any other heated-air method.

Cheddar Cheese Grades Announced

Tentative new U. S. standards for grades of American Cheddar cheese were announced April 29 by the War Food Administration, clarifying and revising present standards. The Food Administration is buying large quantities of Cheddar cheese for export and it is essential that the cheese be purchased on the basis of grades that will assure maintenance of satisfactory quality during shipment.

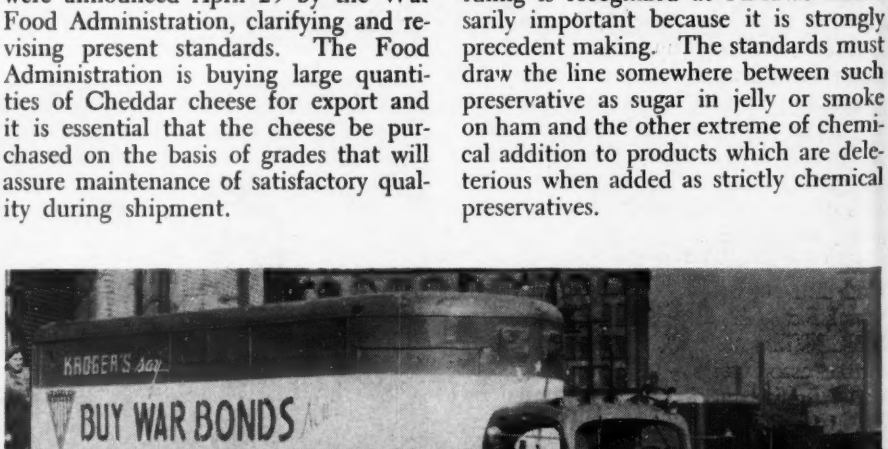
Use of Chemicals Argued by FDA

Basic question of what may be added and what may not considered at cheese hearing

What chemicals may be added to foods, and what should be prohibited, was the basic question discussed at the soft cheese standards hearings conducted by Food and Drug Administration through most of April. As a result of those proceedings a basic decision of policy must eventuate from the government.

Specifically before FDA was the proposal that soft cheese might contain sodium propionate or calcium propionate as optional ingredients. The use of such chemicals was urged by spokesmen of the Du Pont company, who have been applying such commodities for soft cheese and other uses. Company experts testified, and the government experts were cross-examined.

Those favoring permission to use these chemicals say that they are natural and proper additions to prevent mold development and for other purposes. Government men contend that the addition is like the use of boric acid in milk products or the use of other undesirable preservatives. Each party of the proceedings tried to establish a record on which the Administrator would rule in his favor. And this ruling is recognized at FDA as necessarily important because it is strongly precedent making. The standards must draw the line somewhere between such preservative as sugar in jelly or smoke on ham and the other extreme of chemical addition to products which are deleterious when added as strictly chemical preservatives.



FOOD TRUCKS SELL WAR BONDS

The Pittsburgh branch of Kroger Grocery & Baking Co. has enlisted the advertising power of its truck fleet for the promotion of war bond sales. This big semi-trailer is one of a fleet of vehicles carrying the "Buy War Bonds" slogan thousands of miles each week through the streets and highways. A special paint job adds to the effectiveness of the trucks.

BOTTLES DO WAR DUTY

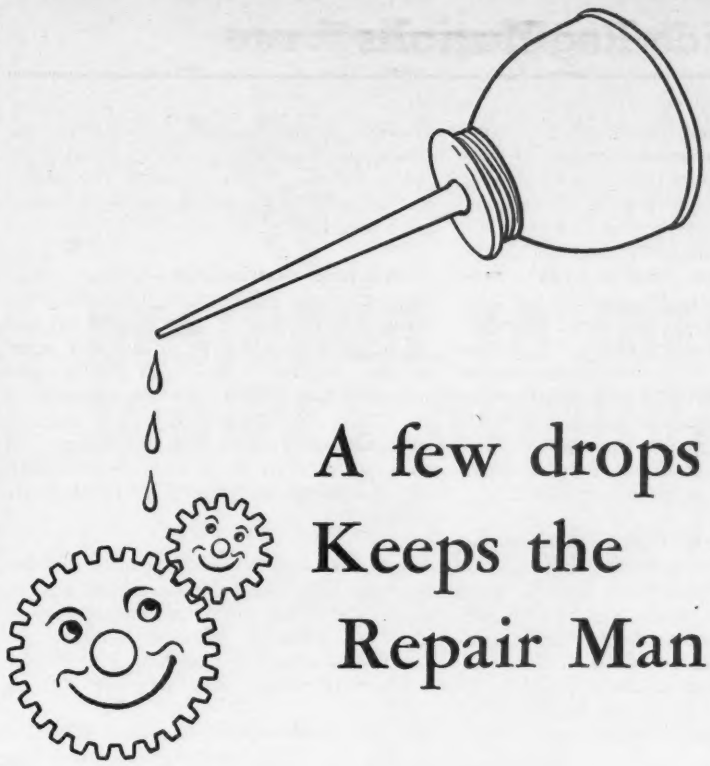
To aid the war effort on the home front, milk bottles are carrying into the kitchens of America such slogans as "Plant a Victory Garden" and "Save Cooking Water from Meats, Vegetables and Fruits." This program has been worked out in cooperation with the Department of Agriculture and follows the "Buy War Bonds" milk bottle campaign started last year when the Treasury Department enlisted the aid of the dairy industry.

Grades, But Not Grade Labeling, Required

It will not be necessary to put the grade of canned fruits and vegetables on the label, as a result of a ruling made by OPA on May 18. This ruling, which settles a controversy of several weeks' duration, was issued as amendment 8 to MPR 306, which revokes the original OPA grade labeling requirement. This amendment, however, provides that all such products for the civilian trade be graded at the cannery, by government inspectors or by the canner, according to standards of the USDA. And the grade thus determined must be stated on the canner's invoice to the purchaser.

To Allocate Production Of Fishery Industry

Allocation plans for production of fishery products in various ports will be worked out to assure an equitable distribution of the catch among canners and processors. Recent ceiling prices on fresh fish upset the fishery industry's auction system of selling to the highest bidder. To give canners, filleters, smokers and wholesale fresh-fish dealers a fair share of the catch it will be necessary to allocate it among the interests wanting to buy.



A few drops a day Keeps the Repair Man away

We know you've a lot on your mind these days, but we really must call your attention to something busy executives seldom think about—the *oil can.*

In the rush to produce the goods, there's always a temptation to neglect cleaning and lubrication of wrapping machines. This is especially true in plants that are working day and night on war orders. Nothing could be more dangerous. For in the case of a precision-built machine, running at high speed, lack of proper lubrication may lead to breakdowns. And we, like other machine-makers, cannot always provide new parts quickly enough to avoid costly delays.

There are comparatively few places on our machines that require lubrication. Moreover, we have so designed the machines that oiling and cleaning can be taken care of with little loss of time . . . So we suggest that you check up with your shop to see that a regular schedule of oiling and cleaning is being maintained.

To assist owners of wrapping machines, we have just issued a booklet entitled "How to keep your Wrapping Machines on the Job for the Duration." If you have not received a copy, write for one.

PACKAGE MACHINERY COMPANY
Springfield, Massachusetts

NEW YORK CHICAGO CLEVELAND LOS ANGELES TORONTO

Mexico: Agencia Comercial Anahuac, Apartado 2303, Mexico, D.F.
Argentina: David H. Orton, Maipu 231, Buenos Aires
England: Baker Perkins, Ltd., Peterborough
Australia: Baker Perkins, Pty., Ltd., Melbourne

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

OPA Price Regulations

Blackplate—A method which producers may use to establish maximum prices for articles made of blackplate instead of tinplate as formerly, without applying to Washington for authorization, is provided by OPA's order No. 414 under Section 1499.3(b) of GMPR, effective April 26, 1943. Specific maximum prices for packers' tin cans made partially of blackplate were established in MPR 350, effective March 31. Maximum prices for other blackplate articles have been established by individual orders under GMPR. The new order is applicable generally to items not covered by MPR 350 and requires producers only to file a statement about the price with OPA.

Pancake, Buckwheat Flour—The provision in GMPR for determining ceiling prices on pancake and buckwheat pancake flour at wholesale and retail was revoked on April 28 in amendment 164 to Supplementary Regulation 14, GMPR. The action was taken because these products already were covered under the fixed-mark-up regulations 237 at wholesale and 238 at retail.

Cocoa Beans—To facilitate shipment of Costa Rican cocoa beans to the Pacific Coast, OPA on April 29 established a differential of 55 cents a hundredweight in favor of Pacific Coast ports over the ex-dock price for New York City. This makes a maximum price of $9.90 a hundredweight for fermented Costa Rican cocoa beans on the Pacific Coast. The action was taken through amendment 4 to revised price schedule 51.

Commercial Refrigeration—Ceiling prices for commercial refrigeration and commercial refrigeration apparatus were ordered reduced on May 10 by OPA by an amount equal to the Federal excise taxes which were repealed Nov. 1, 1942. Amendment 4 to Order A-1 under MPR 188 covered manufacturers' prices, and amendment 169 to Supplementary Regulation 14 to GMPR covered sellers and other levels of distribution.

Sugar—Methods by which primary distributors of direct-consumption sugar can establish maximum prices for grades and packages not formerly prepared for them by OPA were announced on May 4 in amendment 6 to revised price schedule No. 60.

Poultry—Amendment 8 to revised MPR 269 is part of OPA's campaign to smash the black market in poultry. Issued April 22, the amendment simplifies the poultry price regulation to facilitate its enforcement. Uniform prices were established for many different types of poultry, by marked reductions in prices of more expensive birds, and by increases in prices of cheaper poultry. Prices of drawn and quick frozen eviscerated poultry items were reduced by as much as 1 cent to 10 cents per pound. These deductions are slightly offset by increases of from 1½ to 2 cents per pound in the cases of quick frozen eviscerated broilers and fryers.

Cornstarch—Government procurement agencies buying for the account of Lend-Lease were authorized on April 24 to pay for edible cornstarch the same maximum prices which private purchasers are allowed to pay. The amendment 161 to Supplementary Regulation No. 14, GMPR, wiped out a differential established by GMPR between government sales and private sales.

Beef, Veal, Lamb and Mutton—Cents-per-pound prices for specific cuts and grades of beef, veal, lamb and mutton became effective May 17 in 10 zones throughout the nation, in amendment 2 to MPR 355. The new prices represent a reduction in most cases from 1 to 3 cents from retail ceilings originally scheduled to take effect April 15. Further and more substantial reductions were scheduled for June 1.

Chicory—Maximum dollar-and-cents prices at the processors' level for roasted chicory—used increasingly as a coffee extender—in packages of 1 lb. or less, were set on May 12 in amendment 168 to Supplementary Regulation 14, GMPR. The delivered price for the best grade and quality of roasted chicory in granulated or powdered form is set at the rate of $0.18 per pound.

Dried Whole Eggs—Provisions made March 23, 1943, for certain adjustments in the prices of dried whole eggs sold to government procurement agencies were on May 12 made retroactive to March 6, 1943, in amendment 6 to MPR 333. The adjustments provided for certain payments above maximum prices for services performed in connection with the sales.

Processed Hams—Maximum prices for all parts of processed hams (bone-in) and processed picnic hams were cut back from 1 to 3 cents per pound on May 12, in amendment 4 to MPR 336. At the same time, the portion of the ham itself that may be sold in slices was increased to one-third from the former one-fifth.

Glass Containers—In one of the first major steps taken to reduce the pressure on rising food costs since the directive to "hold-the-line" on all prices of cost-of-living foods, OPA on May 12 rolled back prices of wide-mouth glass containers sold to commercial packers. A saving of at least $4,000,000 will be realized by consumers this year as a result. Specific dollars-and-cents ceilings were established in the new order, MPR 382, for all types of wide-mouth glass containers at levels that prevailed July 1, 1941, and replaced current ceilings which reflected October, 1941, prices.

Frankfurters, Sausage—Dollars-and-cents ceilings for wholesale sales of frankfurters, bologna and fresh and smoked sausage, accounting for approximately 60 percent of all sausage sold in this country, were estab-

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Demand these labels when buying uniforms
UNIFORMS OF REEVES ARMY TWILL SCORE A HIT
Efficiency in food production for the Nation's wartime health is aided by neat, trim uniforms—long on wearing qualities. So specify Reeves fabrics for your next uniforms.
REEVES ARMY TWILL meets exacting U. S. Government Tests for better wear, longer life, and colorfastness. Its fabric vitality keeps it "in shape" under trying conditions.
For matching shirts, specify GLENGARRIE POPLIN, a durable, stylish fabric in a wide range of colors. Both fabrics are Sanforized* against shrinking.
*Fabric shrinkage not more than 1% (U. S. Government Test CCC-T-191-a)
See your nearest dealer for uniforms, sport and work clothes made from these famous fabrics, or write for colorful leaflet to:
OVER 60,50 million yards of Reeves Army Twill sold to the U. S. Army
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lished on May 5 in MPR 389. The prices reflect, generally, the March 1942 ceiling prices.

Salt Codfish—OPA on May 10 slapped ceiling prices on salt codfish at levels which represent a substantial reduction under current prices. The action, MPR 384, was taken at the processor level. The rollback, amounting to as much as 7 cents per pound, should be reflected in even larger reductions at the retail level.

Fluid Milk, Cream—Distributors of fluid milk who buy from producers outside the area on which they draw normally are required to observe the price ceilings established in the outside territory, under an order established by OPA on May 5. In amendment 4 to MPR 329, the OPA established a method by which milk distributors who buy milk for resale as fluid milk from producers from whom they did not buy in January, 1943, must pay maximum prices of the base period. To bring prices for fluid cream sold in bulk into line with those of fluid cream sold in containers, OPA on May 14 issued amendment 22 to MPR 280, leveling prices. On May 14, OPA also provided for an increase of 20 cents per gallon to sellers of fluid cream in bottles or paper containers where the butterfat content of the cream had not been changed. The action was taken in amendment 170 to Supplementary Regulation 14, GMPR.

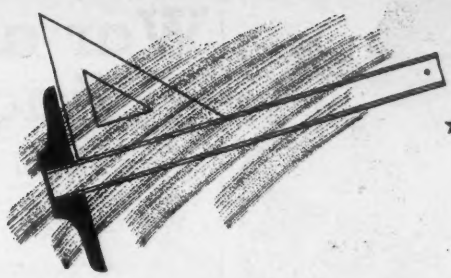
Fresh Vegetables—Ceiling prices set last February on seven major fresh vegetables—tomatoes, snap beans (green and waxed,) carrots, cabbage, green peas, lettuce and spinach—were continued in force with the issuance on April 24 of MPR 376 superseding two temporary regulations previously issued.

Electrolytic Tinplate Tested for Acid Foods

ACID COMMODITIES such as cherries and tomatoes may soon be packed in cans made of lighter gage steel coated with electrolytic tinplate. The trend is in that direction with the idea that substantial amounts of tin and steel can be saved.

The industry already is working on the problems involved. Three subcommittees are studying the technical problems, one on the difficulties presented in the packing of evaporated milk, a second on the conservation of tin and a third on the conservation of steel. Since it will require about 1,725,000 tons of steel to make the tin plate in which this year's crop of fruits and vegetables is packed, the saving of a fraction of a percent will amount to some thousands of tons of metal.

Problems of the can and closure manufacturers that will be brought about by the use of lighter gage sheets have yet to be worked out. The greater use of silver-lead solder in place of tin lead solder in evaporated milk cans and elsewhere is also being investigated.



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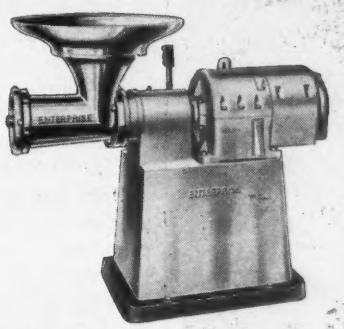

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SALES OFFICES IN PRINCIPAL CITIES

War and Postwar Problems Analyzed by Millers

Higher vitamin level for flour proposed; Increase by 25 percent in flour production recommended

WARTIME PROBLEMS and manner of dealing with them characterized the program of the 41st annual meeting of the Miller's National Federation at the Edgewater Beach Hotel, Chicago, May 3–4.

As reviewed by President Willis C. Helm those problems are: (1) Price ceilings for flour and feed without any on wheat, (2) family flour enrichment, (3) production of granular middlings for alcohol production, (4) maximum carloading and routing, (5) allocation of export shipments, (6) shift of trading units from 196-lb. barrel basis to 100-lb. bag basis, and (7) such others as gasoline, tires, manpower and supplies shortages, priorities, taxes, questionnaires and package differentials.

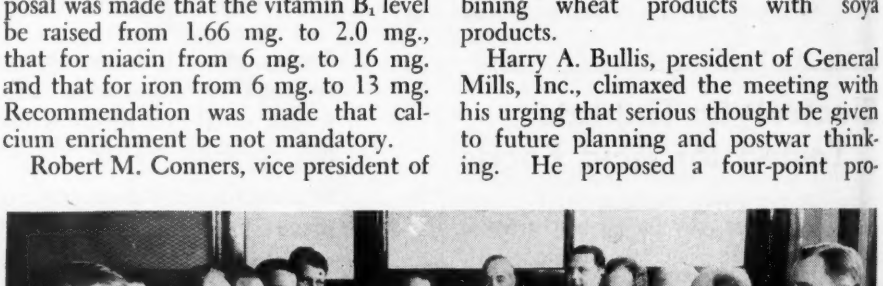
A feature of the meeting was a half-day symposium on these problems. Dr. Clarence Hardenbergh, vice-president of Commander-Larabee Milling Co., reported the work that he and Dr. Betty Sullivan had done with government representatives in arriving at enrichment levels for family flour, which may become mandatory in the near future; bakers' flour is not included. The proposal was made that the vitamin B_1 level be raised from 1.66 mg. to 2.0 mg., that for niacin from 6 mg. to 16 mg. and that for iron from 6 mg. to 13 mg. Recommendation was made that calcium enrichment be not mandatory.

Robert M. Conners, vice president of Chase Bag Co. emphasized the shortage in bags for packaging flour and the need for accepting any substitute available for the present.

M. A. Briggs, president of Austin-Heaton Co., Durham, N. C., called attention to the 25 percent decline in family flour consumption, particularly since the rationing of shortening, and cited the need for a committee to work for greater household supplies of shortenings as has been done for the bakers. Otherwise the decrease in consumption of family flour is likely to increase.

In his summary of the opportunities before the flour milling industry, Cyrus S. Kauffman, of the Food Distribution Administration, highlighted the recently recommended increase of 25 percent in flour production to meet the United States nutritional needs. He stated that the government was not going to order the 25 percent increase in production nor was it going to force flour products down the throat of domestic consumers. He recommended marketing of wheat products on the basis of their nutritional value instead of on a price basis and indicated the advisability of combining wheat products with soya products.

Harry A. Bullis, president of General Mills, Inc., climaxed the meeting with his urging that serious thought be given to future planning and postwar thinking. He proposed a four-point pro-



BRAINS OF ARMY FOOD BUYING

More than 200 years' accumulated experience in the buying of groceries is represented in the men pictured here, who have been recruited as the top-flight brains from the nation's major food distributing organizations and industries to work with the Quartermaster Corps on the problems of feeding America's Army of millions. Left to right, they are: Lt. Col. Lynn O. Whitaker, in charge of grocery branch; Frank H. Matthews, chief buyer of canned vegetables; John A. Moilanen, buyer of canned vegetables; Lt. F. W. Pfizenmayer, buyer of baked goods, L. S. Tralmer, buyer of dried beans, peas and rice; B. J. Bathel, buyer of dairy products; Lt. Col. J. W. Fraser, executive officer, procurement division; Harry B. Williams, assistant buyer, dried beans, peas and rice; M. W. Bishop, buyer of dehydrated vegetables; Major E. H. Fisher, officer in charge of rations branch; Leo Hecht, buyer of special rations; Capt. T. J. Dennehy, contracting officer for special rations; and J. F. Driscoll, buyer of macaroni, spaghetti and noodles.

gram of: (1) Improved quality of milling industry products, (2) development of new uses for the industry's products, (3) preparation for postwar employment of returning service men, and (4) laying plans for a six- to twelve-month adjustment period that will follow the return of peace and be preliminary to a two- to five-year period of highly stimulated industrial activity.

Cereal Industry Forms Promotion Institute

SEVEN large manufacturers of cereal products are contemplating the idea of better breakfasts. These companies believe that wartime work would be better done if the day started with a wholesome, hearty breakfast, instead of the sketchy meal many eat before going to work. They have organized a Cereal Institute which is going to undertake an educational campaign from its Chicago headquarters. Logically, these cereal-products makers hope to sell more breakfast food if the bigger breakfast movement gets well under way. But their effort is much broader and only incidentally will bring out the trade consideration of eating breakfast cereal.

The founding companies of the Institute, which is still in the course of organization, are: Quaker Oats Co., Chicago; Cream of Wheat Co., Minneapolis; General Mills, Inc., Minneapolis; Pillsbury Flour Mills Co., Minneapolis; National Biscuit Co., New York; General Foods Corp., New York; and Kellogg Co., Battle Creek, Mich.

The present officers are: President, Cullen Thomas, General Mills, Inc.; vice-president, Clarence Eldridge, General Foods Corp.; secretary, Earl Freeman, Kellogg Co.; treasurer, Don Laurie, Quaker Oats Co.

Will Teach Sanitation

TUITION-FREE night courses in Sanitation Problems in Food Handling and Processing will begin June 7 at the School of Engineering, Manhattan College, New York, under the supervision of Dr. J. H. Shrader, editor of the *Journal of Milk Technology*. The six-weeks' course will be organized in sections covering the following branches of the food industry: meat and fish; milk and dairy products; poultry and eggs; bakery products; confectionery and bakery supplies; institutions and eating establishments and commercial food storage. Purpose of the course, sponsored by Manhattan College in cooperation with the Department of Health of New York City, is to offer training in methods of food technology and sanitation as a means of increasing wartime food production.

UNMASKED!

At last, one of the most rapscallion of mischief-makers has been discovered . . . the Gremlin Aquaticus. Arch-villain of the species!

He's the shameless rascal who does the dirty work to water. "Hardens" it unmercifully so that equipment "scales," bottles rust, food wastes, and dishes won't wash clean.

We know. We've been routing him for years. Being chemical-minded, we attribute his dire deeds to *minerals*. The Wyandotte Man encounters these troubles every day. He detects Gremlins in every sort of water supply . . . and determines the proper Wyandotte compound to do cleaning and washing as customers want it done.

Accurate field control of washing methods is only one of many ways in which Wyandotte helps business oust its "Gremlins." It's merely one more reason why *any* cleaning problem . . . from washing milk cans and bottles to vats and tanks . . . can be confidently entrusted to Wyandotte.

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SERVICE REPRESENTATIVES IN 88 CITIES

WYANDOTTE CHEMICALS CORPORATION
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Food Administration Orders

Honey—Amendment 1 to FDO 47, issued April 6, revises the honey quota originally set up. During the three-month period ending June 30, 1943, and during each subsequent three-month period until otherwise ordered, no person may use more honey in manufacturing other products than 600 lb., or 120 percent of the amount of honey used by him during the corresponding quarter of 1941, whichever is greater.

Spice Quotas—To prepare for the spice needs of increased home canning and cooking during the summer months, the War Food Administration on April 26 increased the quota of black and white pepper, cinnamon and allspice applying at the manufacturer-wholesaler level. Amendment 2 to FDO 19.1, effective April 27, raised the quota of black and white pepper for the quarterly period beginning April 1, 1943, from 45 to 60 percent of the corresponding quarter of 1941. The quota percentage for cinnamon was increased from 30 to 40 percent. In view of the recently increased supplies of allspice, the quota level was raised from 100 to 115 percent.

Beef Quotas—On May 1 the War Food Administration announced amendment 2 to FDO 27, suspending for the month of May all temporary beef quotas and temporary increases in beef quotas to butchers and local slaughterers. The amendment made more beef available to the armed forces, and provided a more even distribution to civilians.

Corn—FDO 52, issued May 4, limits purchases and deliveries of corn by manufacturers and feed mixers to a 45-day supply, and purchases by feeders to a 90-day supply, including stocks on hand.

Milk Deliveries—According to terms of amendment 1 to FDO 11, issued April 9, no handler may deliver milk in containers of less than 1 qt. in size to homes of consumers, and no handler may sell milk in containers of less than 1 qt. in size for home consumption.

Molasses Transferred—Restrictions on deliveries and usage of edible molasses are now handled by the War Food Administration, which took over control of the commodity from WPB on April 26. The action, FDO 51, supersedes M-54 and contains in general the same provisions as the WPB order.

Butter, Cheese—To avoid possible civilian shortages of butter and cheese during low-production months next winter, the War Food Administration on May 1 changed its set-aside orders on these products. The percentage of production that must be held for government purchase during May, June and July was set at 50 percent for butter and 70 percent for Cheddar cheese. The amendments to FDO 2 (butter) and FDO 15 (cheese) will enable government agencies to buy all the butter and cheese that are required to be set aside during the summer months and store these purchases to meet winter requirements.

Give Report on Quick Freezing

Industry committee reports on freezing fruits, vegetables in ice cream plants

MEETING recently in New York to discuss developments, the International Association of Ice Cream Manufacturers' Frozen Food Committee adopted a 5-point resolution to aid the government in the freezing of foods.

Salient points of the resolution included the following statements:

"It appears possible to freeze fruits and vegetables with a resultant product of satisfactory quality by various alternative methods of freezing which can be carried on in ice cream plants with existing facilities.

"The requirements of the regular ice cream business preclude the use of hardening rooms for the storage of other frozen foods except in individual instances where excess storage space is available.

"A study made by members of the committee indicates that it would be practicable to adapt ice storage warehouses found in most centers of population to the storage of frozen foods, although this would involve some capital outlay.

"The ice cream industry's distribution facilities are easily adaptable to the handling of frozen foods. Adequately low temperatures are regularly maintained in the distribution cabinets used in merchandising ice cream, and with certain changes in the laws or regulations of some states, a part of the space in such cabinets might be made available for frozen foods.

"Since the most difficult problem presented in adapting the ice cream industry to the handling of frozen foods is the procurement and preparation of raw produce of satisfactory quality and quantity, and most ice cream manufacturers are poorly equipped in both experience and facilities in this task, it would be essential to obtain the cooperation of the canning industry.

"It would be desirable for ice cream manufacturers contemplating cooperation in any program for expansion of frozen food production to engage in limited pilot plant operations on a commercial scale before engaging in the business on a large scale.

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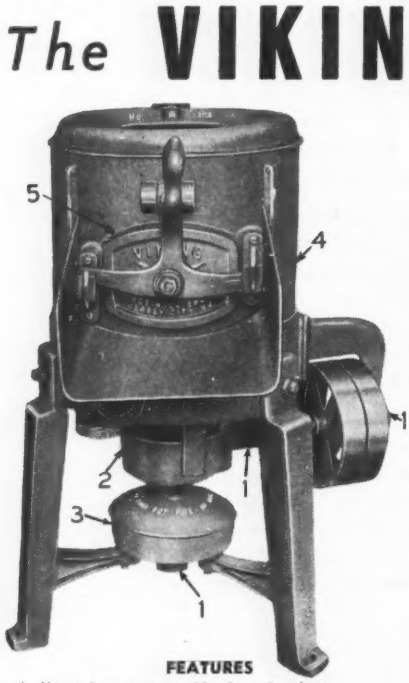

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Waste reduced to absolute minimum—and recoverable for cattle feed. Most economical in first cost, operation, maintenance and space.

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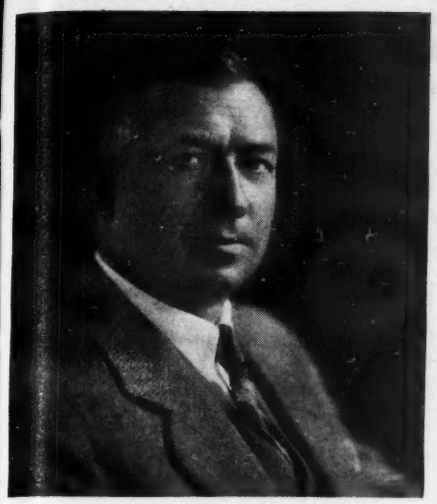

M. LEE MARSHALL

Marshall Appointed To Assist Davis

BY THE APPOINTMENT of M. Lee Marshall as Deputy Administrator of the War Food Administration, Chester Davis has neatly avoided one of the mistakes that cost the Secretary of Agriculture his control of the food program. In his new position Mr. Marshall has control over programs relating to supplies, machinery, equipment, materials and facilities used in producing and processing food. Mr. Wickard did not fight hard enough to secure the needed critical materials, and when he entered his plea he did not talk the language of the rest of the claimants or the requirements committee. It is expected that Mr. Marshall will avoid these pitfalls easily.

The new Deputy Administrator has a long experience in the food business, but more important to the success of his present position is his relatively long experience in Washington. His first war work was with the Army Service Forces, where he organized and headed the Shipping Procedures Branch. Later he became Food Consultant to WPB Chairman Donald Nelson. Thus, he brings with him to the War Food Administration the confidence of the Army men with whom he has worked and of the War Production Board and its chairman. He also knows how the WPB works and how the Requirements Committee functions.

SCHEDULE OF EVENTS

JUNE

1- 4—American Society of Refrigerating Engineers, 30th spring meeting, Hotel Statler, Cleveland, Ohio.
2- 3—National Confectioners' Association conference on wartime problems, Chicago, Ill.
2- 4—Institute of Food Technologists, annual meeting, Hotel Statler, St. Louis Mo.
8-10—Dairy Manufacturers' conference, University of Illinois College of Agriculture, Urbana, Ill.

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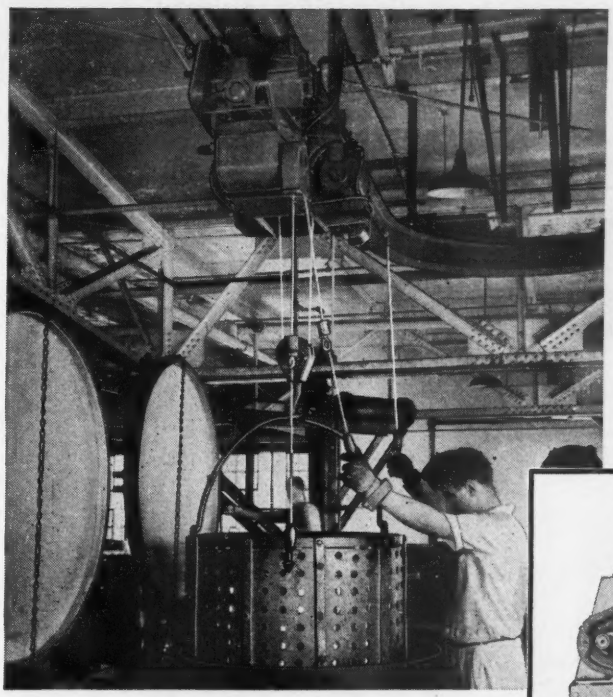
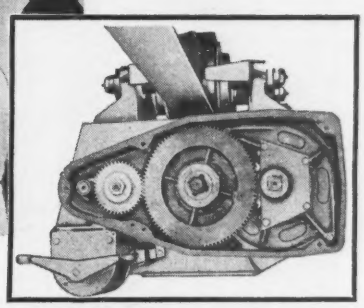


Read what Crosse & Blackwell Co. says! "The 4 R & M Motor-Driven Hoists which we installed last year are helping us to do our part in aiding the country's war effort. They are both time and labor savers."



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Whether you require capacities of 1,000 or 15,000 lbs., there's an R & M Electric Hoist *tailor-made* for the job, and it can be equipped with special trolleys to fit any type of monorail. Where greater distances of movement and high-speed transportation are essential, investigate R & M's complete line of Motor-Driven Trolleys.

The following R & M Food Hoist distributors, or your nearest R & M sales and service office, will be glad to furnish complete details. Or write for factual Bulletins 6161A and 7171A.

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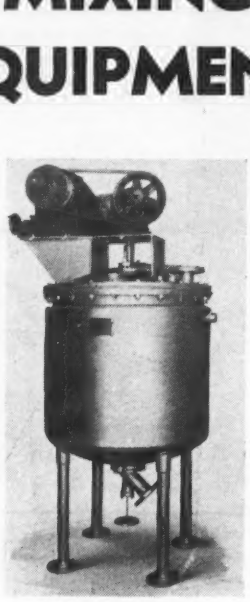

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CAPITAL VIEWS

FOOD-LABOR SEESAW—The inflation teeter-totter is continuing, with wage demands and price rises alternating as economic unbalance occurs. The effort to force both wages and food prices down will require superman effort by Roosevelt, Byrnes & Co. The food processor is a bystander who inevitably gets much of the mud thrown by the parties to this economic controversy. Even if economic restraints can be placed, there are more difficult times ahead for the food manufacturers as vanishing profit also becomes prospective red ink.

SQUEEZE OR SUBSIDY—As the rollback in prices is attempted by OPA the squeeze on processors becomes acute whenever irreducible prices for farm products are encountered at the first processing level. If Congress, which enthusiastically dislikes subsidies for any group, including farmers, prevents the use of subsidies for relief at this processing level, the results are likely to be disastrous for millers, meat packers and other processors of products from farm and range. During the heat of battle in May it is impossible to tell whether this measure of relief will be permitted or not. No effective alternative seems to be offered. But that will not stop politically minded legislators.

MORE RED MEAT—The need for more meat in the diet of those engaged in heavy labor, like coal miners, is now being pressed in Washington. If anyone can figure out how these needs can be met with special rations that are *politically* feasible, he will render a very great service both to the workers and to the distributors of meat by producing such workable plan promptly. This is but one of the jobs for which we need an effective Office of Civilian Supply.

TO RESTRAIN OR TO AID—Control of strikes by Congressional legislation is being attempted. The philosophy is that Uncle Sam can take over the plants where labor difficulties cannot be solved by standard proceedings; and thus it is hoped that further strikes will be prevented. Actually there is danger that this sort of legislation will encourage irresponsible labor leadership to develop bad labor situations so that the workers can get rid of unfriendly management and secure government control. There are many leaders who seem to be willing to go to those limits, with the ill-hidden objective of socializing industry. Washington really wonders whether such legislation is going to control or to aggravate such labor problems.

PETTICOAT BOSSES—Many heavy jobs in food factories could be done by near-moron labor under proper direction. Some managements are going to need to figure out ways in which feminine brains can boss masculine brawn on such tasks. (It is probably wrong to speak of the prospective leaders as "petticoat" bosses, judging from modern factory costume; but the idea will bear investigation regardless of what we call it.)

UNSAFE FOOD—Again the Food and Drug Administration comes up with a warning against use of improper solvents in food formulas. This time the warning is against the use of dangerous substitutes for glycerine. This only further emphasizes what should be better recognized as a fact—that management must take great care in developing new food formulas that no new component is used which has any doubtful physiological significance. Too many have thought this an academic matter. They should recall the horrible effects when certain elixir makers "took a chance."

ESSENTIAL FOOD WORKERS—The processing of foods is an essential wartime activity. This means that the policies for hiring workers in food plants will not be very much restricted by the labor-freeze

ELECTED BY SOUTHERN BAKERS

At its recent annual conference in Atlanta, Southern Bakers Association elected these men as officers. They are, left to right, B. R. Fuller, Jr., Bell Bakeries, Inc., Daytona Beach, Fla., first vice-president; Roy Jacobson, H. H. Claussen's, Inc., Augusta, Ga., president; Raymond Streb, Royal Baking Co., Raleigh, N. C., second vice-president; and C. M. McMillan, Atlanta, Ga., secretary-treasurer. At the conference the bakers reported that the cut in sugar and chocolate has already reduced the production of breads and cakes far below the demands of the market, and any cut in shortening was protested. The members agreed that quantity and not quality should be curtailed to keep within OPA requirements.

situation of Washington. But it is going to be pretty difficult to protect underpaid food-plant staffs against raids by other essential industries. Each management is going to have to struggle with the problem of getting raises for essential workers whenever they will otherwise be drawn away to equally essential industry of other types. The Food Administrator knows the seriousness of this situation, because at last official Washington is beginning to appreciate that the quantity of food which can be delivered safely at the kitchen depends very much on the effective work of the food processors. Even record-breaking crops, which we probably will not get, are mostly of no value until processed so that they will keep for use in the home.

OPA FAILURES—The failure of ex-Senator Prentiss Brown to secure effective reorganization of OPA has lead to extreme forecasts in Washington. One such forecast from an eminently responsible source says "OPA will be dismembered within a few months." Apparently all observers admit that the removal of Leon Henderson has been only one of many steps needed to correct OPA deficiencies, on which Congress is going to insist. The real question is—so far as it hits the food industries—"How can price controls be maintained with political pressure groups exerting almost irresistible force to distort them?" A dictator disposition with unlimited power back of it might accomplish the job. But almost no one expects that extreme remedy to come, nor wants it.

MORE FOOD—More and more it is emphasized in Washington that more food must be produced. One official release from the Department of Agriculture goes so far as to urge the picking of wild weeds as greens. We wonder why Axis propagandists don't grab on items such as this to demonstrate the prospective collapse of American economy. Less alarming, but perhaps more useful, are other recent recommendations, such as the requirement that all raisin-type grapes must be made into raisins (none into wine), the extreme efforts to promote soybean products and the adoption of other newer food materials. Meantime, the Army and Lend-Lease are defending the huge frozen stocks on hand and their export programs, seeking to convince the public that they are not diverting too much food from the American kitchen. At least it is encouraging to note that these export agencies now act like responsible claimant groups. Previously they acted in some of their purchasing and planning as if they had no responsibility to the American public.

SIZE CUT PROHIBITED—The Court of Appeals has ruled that cutting the size of a candy bar without reduction in price is properly restrained by OPA action under the general maximum price rules. In effect the court finds that cutting the size of a unit delivery is equivalent to raising the price and therefore violates the anti-inflation efforts properly made by the government. There are many ramifications and implications of this decision that must be taken into account by food manufacturers.

EYES THAT GUARD YOUR REPUTATION

The very life of your business depends on the purity and uniformity of every ingredient that goes into your products.

Yet the human element enters even into the production of fine food flavors—one of the most closely controlled operations in all industry.

That's why Monsanto control laboratories are staffed by highly skilled chemists. And that's why you can depend on controlled quality in *every* shipment of *every* Monsanto flavor that reaches your plant. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, St. Louis, Missouri.

MONSANTO CHEMICALS

Monsanto Food Flavors of *Controlled* Quality

Vanillin Monsanto — **Methyl Salicylate U. S. P.**
Ethavan (Ethyl vanillin) — **Coumarin Monsanto**

SERVING INDUSTRY...WHICH SERVES MANKIND

CCC Explains Subsidy Plan

Method of computing subsidies on tomatoes, corn, green peas, snap beans announced

FORMAL announcement of the procedure to be followed by Commodity Credit Corp. in subsidizing the processors of tomatoes, sweet corn, green peas and snap beans was made on May 15. On that date CCC mailed all vegetable processors an offer to participate in the plan. Briefly, the government offers to buy vegetables for which the grower has been paid the support price and immediately resell them to the canner, briner or freezer at a lower price. This offer applies only to processed vegetables sold for civilian consumption.

To be eligible the processor must make contracts with the growers at the support prices for his area. These contracts must be approved by the State War Board.

Following the general rule for settlements, if a briner should sell to a canner who in turn packs the vegetable, the canner must report to the briner what part of the brined vegetables eventually reached the civilian market.

The way the amount due the processor is computed is simple and logical. Since sales of canned and brined vegetables are made by the case the total tonnage delivered to the processor is converted to cases of 24 No. 2 cans. No matter what size of can is used, the total quantity of the various container sizes is converted to the equivalent number of cases of 24 No. 2 cans. Then, keeping in mind the general rule for settlements, the cases that have been sold for civilian consumption are converted back into tonnage of each raw vegetable. The resulting tonnages are the amounts that Commodity Credit is deemed to have purchased and resold. In the formal offer Commodity Credit specifies that these computations shall be carried out on a percentage basis.

If a processor secures raw vegetables from two or more areas which have different purchase and resale prices specified in the Commodity Credit table, settlement is made on the following basis. The percent of the total tonnage available for civilian consumption is computed. Take this percent of the tonnage delivered from each area. The result is the tonnage from each area that is purchased and resold by Commodity Credit.

When two or more varieties of a vegetable have different specified purchase and resale prices, each variety is considered as a separate vegetable. The tonnage purchased and resold by Commodity Credit is figured accordingly.

The government has a provision to cover an increase in the processors' ceiling price. In that event the resale price is to be raised an equivalent amount on the part of the pack sold for civilian consumption, the rise in the resale price becoming effective at the time OPA raises the ceiling price.

In cases where it can be shown that undue hardship results from the terms of this offer or where it can be shown that the processor had to assume additional costs in order to secure delivery of the raw vegetables, the processor may apply for relief.

The final acceptance date for the offer is July 1, 1943, although Commodity Credit may approve a later date in special cases.

SEALTITE will STRETCH your Manpower

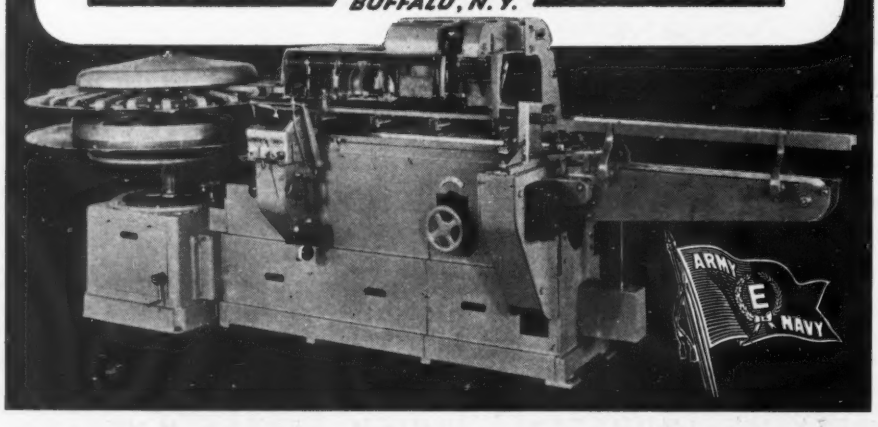
Because the SEALTITE Bag Sealer is fully automatic, in operation it releases several operators per machine and speeds up packaging production at the same time.

SEALTITE closes and seals any standard gusseted paper bag from 2 to 10 lb. capacity. Speeds range from 15 to 50 bags per minute.

SEALTITE delivers a tight, sift-proof seal and makes a most attractive package with a *square, flat top.*

Because SEALTITE speeds up packaging line production and uses fewer operators, savings as high as $300.00 per month per machine are reported. Write for information.

CONSOLIDATED PACKAGING MACHINERY CORP.
BUFFALO, N.Y.



Fats, Oils Reallocated More Production Seen

DISTRIBUTION of fats and oils to industrial users underwent a complete change when Food Distribution Order 29 went into effect in mid-April. This order, which put the movement of peanut, soybean, cottonseed and corn oils into commercial channels on a monthly allocation basis, was further modified at the end of April. An amendment provided that edible oils allocated under FDO 29 but not used by the manufacturer for the specified purpose and within the specified time would revert to inventory and would have to be reallocated before being used. Users must now account for the oils allocated to them and the use must be consistent with the allocation.

On the supply side there is every indication that the domestic production will improve this year, because of an increase in facilities to harvest and process the oil seed crops. Several new expellers to be installed this year will increase capacity for crushing soy beans.

Rationing Lifted On Dried Soups

ALL dried and dehydrated soups were temporarily removed from rationing in an emergency order issued by OPA on May 2, after official point charts for May were printed. OPA and the War Food Administration came to a joint decision to make dried or dehydrated soups ration-free for the time being, after a study of new production statistics disclosed that record-breaking production was outstripping purchases.

WPB Orders

Pumps—A shortage in the supply of certain critical materials and facilities used in the manufacture of pumps for defense, private account and export, brought about issuance of L-246 on April 12 controlling production and distribution. L-246 covers all types of industrial pumps, cellar drainers and hydraulic mechanism pumps, with a few exceptions. Most pumps under the order take AA-5 or higher preference ratings.

Wooden Shipping Containers—Manufacturers of wooden shipping containers for fresh fruits and vegetables were granted an additional three months to use up their inventories of non-standard container parts which were cut to size before issuance of L-232 on March 1, 1943. The order provides standardized and simplified wooden shipping containers for fresh fruits and vegetables to conserve lumber, metals and manpower.

Insecticides—WPB on April 26 placed under control of the War Food Administrator supplies of pyrethrum insecticides allocated to agriculture. WPB Directive 15 gives authority to the War Food Administrator with respect to the sale or other disposition of pyrethrum insecticides to ultimate agricultural consumers and the use of pyrethrum insecticides in agriculture by such consumers.

Nicotinic Acid—The use of nicotinic acid by any person in any calendar month was limited to 5 oz., according to M-315, issued May 4. Each person seeking authorization to accept delivery of nicotinic acid during any calendar month beginning with June, 1943, whether for his own consumption or for resale, and each person seeking authorization to use nicotinic acid shall file application to that affect with WPB before the 15th day of the preceding month.

Packaging Frozen Foods—New restrictions on the manufacture of paper boxes for packaging frozen foods were imposed in L-239, amended on April 15. Paperboard used in folding and set up boxes for packaging frozen food must comply with specifications outlined in a technical table in the text of the order. New type boxes permitted by the amendment will help the frozen food program.

Thiamine Hydrochloride—A shortage in thiamine hydrochloride made necessary M-314 issued May 4, limiting delivery and acceptance of the product. Delivery by any person to any other person in any calendar month, or acceptance of delivery is restricted to not more than 25 grams.

360 Dehydrators Listed

National Dehydrators Association has compiled a dehydrated food classified directory, listing 360 concerns operating 417 plants. This is exclusive of milk driers and the many widely separated plants operated by Borden Co.,

Wherever There's WAR ACTIVITY
There's a DISTRIBUTOR Serving It

The distributor is rendering an indispensable service these days. With his complete familiarity with requirements and sources of supply, he is helping hard-pressed procurement offices to obtain vitally needed equipment and supplies for the Army, Navy, Maritime Commission and Air Force... not to mention his services to the thousand-and-one other industries engaged in war work.

He's alive to the needs of the times and his wide experience qualifies him as the logical force to ferret out those needs...he's here, there and everywhere—any hour of the day or night. He knows that he justifies his existence only in the measure that he renders service.

Long ago, Lunkenheimer recognized the distributor as the most efficient and economical means of marketing its products and built up nation-wide distribution through leading supply houses. We salute these distributors for the outstanding job they are doing in helping to speed up war production.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

LUNKENHEIMER VALVES

Stokley Brothers & Co. and Swift & Co., but it includes plants under construction. Omitting the latter and also egg and meat dehydrators, 278 concerns were found to be operating 317 plants.

Soybean Products Expand Rapidly

INCREASED demand for high protein meat substitutes, for both military and civilian needs, has brought rapid expansion to the production of edible soybean products other than oil. In particular, the demand for soybean flour, grits and flakes has increased, and present expectations are that the production capacity for these products will reach a level of 1,500,000,000 lb. annually by the end of this year.

While most of these products have so far gone into foods for military and lend-lease shipment, they are beginning to find a place in the diet of civilians at home. As a means of extending the meat supply and also for fortifying cereal products, soybean proteins find a ready acceptance. The principal uses at present are in soups, as extenders in sausage and other meat products, in breakfast foods, and, as flour, in baked foods.

Prospects for Crops Not Good This Year

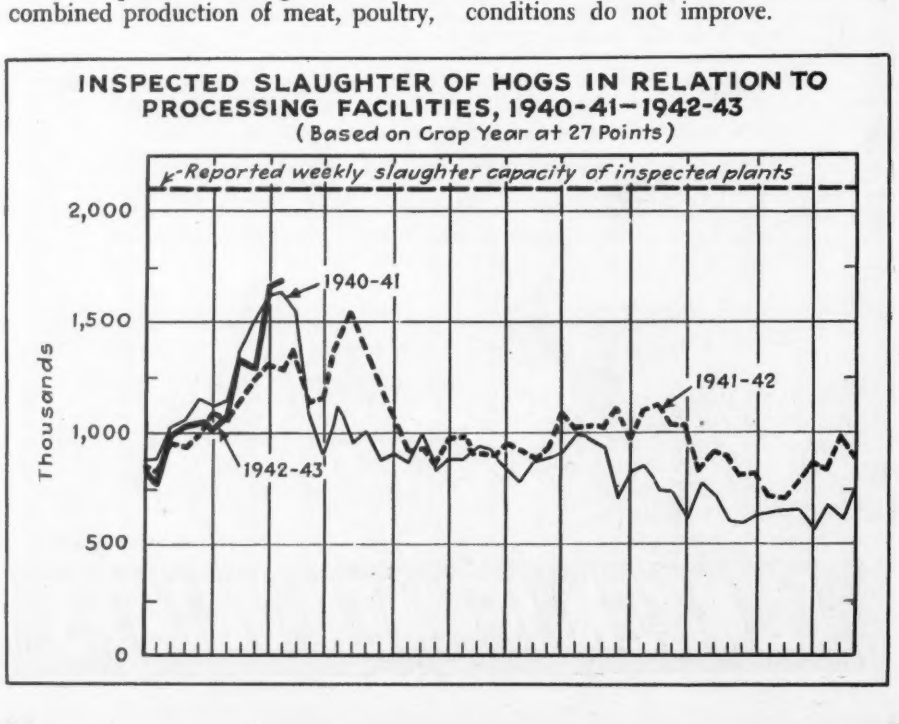
IN spite of poor prospects for the 1943 wheat crop, and other bad spots in the food outlook, some record breaking crops are expected this year and total food production should be high, barring the effect of too adverse weather conditions. According to the U. S. Department of Agriculture, the combined production of meat, poultry, eggs and dairy products this year is expected to exceed any past records.

Farm crops, with only average weather from now on, are expected to be 12 percent below 1942, but about 20 percent over the 1923–1932 average. The fruit outlook is rather spotty, with citrus fruit production expected to surpass any other year, but output of peaches unusually low and yields of other fruits expected to be not above average.

Among the truck and processing crops, potato production is expected to be average and other vegetables will be abundant, but not up to the record output of 1942.

Crop and Feed Outlook Causes Apprehension

RECENT requests from government sources to farmers to curtail the production of broiler chickens and to limit the Fall pig production to an increase over 1942 of 15 percent, serve to highlight a serious feed situation. In spite of the fact that the 1942–43 marketing season started with the largest supplies of livestock feeds on record, the increased numbers of animals and chickens on farms has caused feed supplies rapidly to approach the vanishing point. Figures released by the government indicate that the disappearance of feed during this marketing year will account for the full 1942 corn crop of 3,175,000,000 bu., plus the entire 1942 crops of oats, barley and grain sorghums, and 300,000,000 bu. of wheat. The corn carryover on October 1st is now expected to be 492,000,000 bu., the same as last year, and may be lower if crop conditions do not improve.



CONSTRUCTION NEWS

	Pending (thousands)	Awarded May (thousands)	Total Awarded 1943 (thousands)
Bakery	$50	.....	.....
Beverages	.....	.....	.....
Canning and Preserving	40	.....	$115
Cold Storage Plants	80	.....	40
Confectionery	.....	.....	40
Grain Mill Products	165	.....	557
Ice Manufactured	80	.....	40
Meats and Meat-Products	55	$40	165
Milk Products	300	40	200
Miscellaneous	510	45	1,425
	$1,280	$125	$2,582

In the face of this situation, the prospective feed supply for 1943–44 is set at 10 percent below last year. The May report of the Crop Reporting Board indicates the lowest yield of winter wheat in years, an oat crop below average, rye production lower than in 1942, but hay and pasture conditions somewhat above average. Against this unpromising situation, we must place the fact that the expected increase in livestock numbers for the year is 12 percent.

As a means of relieving this prospective feed shortage, the Department of Agriculture early in May instituted the following program: (1) Limitations on cash corn transactions and on holdings, in order to make more feed available and prevent hoarding; (2) curtailment of the wheat export program, making available another 14,000,000 bu. of wheat; (3) an effort to obtain machinery to convert the spent mash from grain alcohol production into protein feeds; (4) an increase in wheat acreage, beginning with the winter wheat crop to be planted next Fall, and increases in 1944 in the plantings of soybeans and other oil seed crops that produce protein feeds as a byproduct of oil production.

Commodity Prices Grow Steadier

IN the month from April 17, 1943, to May 15, indexes of commodity prices have shown a distinct tendency to level off. This is shown by the general commodity price index of the *New York Journal of Commerce*, which stood at 108.4 on the earlier date and had only risen to 108.6 by the end of the period. The same publication's index for grains fell from 110.7 to 110.4 in the same four weeks, while its index for food prices rose from 113.6 to 114.5, one of the smallest rises in food price index in any recent month.

Among the spot prices of those food

commodities that are not yet under ceilings, there was also little change during the period from mid-April to mid-May, the only notable increase being in the price of flour, from $3.41 to $3.62 per 100 lb. sack.

Fish Shortage Is Becoming Serious

In spite of efforts to introduce new fishery products, such as canned sea mussels, skate and shark meat, it is becoming evident that supplies of sea food in 1943 will be far below normal. Stemming mostly from the action of the government in seizing the best vessels of the fishing fleet for other purposes and in restricting the activities of fishermen, and aggravated by manpower shortages, production of fishery products this year is forecast at 3,650,000,000 lb., a drop of 150,000,000 lb. below 1942 production, and far below the output of normal peacetime years.

INDICATORS

Cocoa beans brought into the United States from January 1, 1943, to May 13, 1943, totaled 1,428,051 bags, compared to 583,162 bags for the corresponding period of the preceding year.

Confectionery and competitive chocolate products sales in March, 1943, as reported by the Department of Commerce for 220 firms, totaled $39,671,000, an advance of 26 percent over sales reported by the same firms a year earlier.

Flour production in April, 1943, as reported by *The Northwestern Miller* for mills producing 65 percent of United States output, totaled 12,608,000 sacks (cwt.), compared to 14,112,719 sacks in March, 1943, and to 10,242,600 sacks in April, 1942.

Shrimp canning in the Gulf and South Atlantic states, in the first quarter of 1943, was approximately 20 percent below the figure for the 1942 first quarter.

Pork production in March, 1943, was the largest on record for the month and exceeded March, 1942, by 25 percent.

Beef production in March, 1943, was the second largest on record, being exceeded only by March, 1942, and was 40 percent above the March averages in 1929-1933.

Peanuts milled in the 1942-1943 season, up to March 31, totaled 1,207,235,000 lb., up 55 percent over millings for the corresponding period of the previous season.

Tomato pack total for 1942, in terms of standard cases, totaled 41,247,702 cases, according to National Canners Association.

Tomato acreage expected to be planted for processing in 1943 was reported at 637,800 acres, compared to 622,950 acres actually planted last year.

Beets planted for processing this year are expected to take 19,000 acres, compared to 17,980 acres actually planted in 1943.

Cucumbers for pickles to be planted this year are estimated at 109,420 acres, 13 percent below the plantings in 1942.

Kraut packers' intentions to contract and plant in 1943 are reported as 73 percent above actual contracts and planting last year.

Pimientos to be planted for processing this year are expected to take 13,100 acres, an increase of 14 percent over last year's actual plantings.

Lima beans for processing are expected to be planted on 75,660 acres in 1943, compared to the 76,050 acres actually planted in 1942.

Eggs, dried, produced in March, 1943, totaled 23,417,000 lb., compared to 19,691,000 lb. in March, 1942.

Eggs, liquid, produced in March, 1943, totaled 148,320,000 lb., compared to 117,152,000 lb. in March, 1942.

Butter, creamery, produced in March, 1943, totaled 140,075,000 lb., compared to 135,920,000 lb. in March, 1942, and to a March average of 130,614,000 lb. in 1932-1941.

Butter, creamery, produced in the first quarter of 1943 totaled 384,950,000 lb., 3 percent over the 1942 total and 4.5 percent over the 1932-1941 average for the period.

Cheese, American, produced in March, 1943, totaled 58,035,000 lb., 24.8 percent below the March, 1942, output of 77,215,000 lb., but 71.2 percent over the 1932-1941 March average of 33,893,000 lb.

Cheese, American, produced in the first quarter of 1943 totaled 151,525,000 lb., 25 percent below the first quarter output in 1942, but 68.8 percent over the average production for the period in 1932-1941.

Evaporated milk produced in March, 1943, totaled 252,869,000 lb., 26 percent lower than production in March, 1942, but 38 percent over the 1937-1941 average output for the month.

Condensed milk, all kinds, produced in March, 1943, was 69,668,000 lb. compared to 65,167,000 lb. in March, 1942, and 68 percent over the 1937-1941 March average.

Milk, dried, whole, produced in March, 1943, totaled 11,250,000 lb., an increase of 165 percent over the 4,245,000 lb. produced in March, 1942, and 434 percent over the March average for 1937-1941. The total output of this product for the first quarter of 1943 was 27,150,000 lb., an increase of 153 percent over output in the first quarter of 1942.

Milk, dried, skim, produced in March, 1943, totaled 42,150,000 lb., compared to 54,070,000 lb. produced in March, 1942. This quantity was 9 percent over the 1937-1941 average. For the first quarter of 1943 production was 104,850,000 lb., 23 percent below the first quarter of the preceding year.

Oleomargarine sales in March, 1943, as indicated by sales of internal revenue stamps, totaled 53,561,561 lb., in increase of 85 percent over sales in March, 1942. For the first quarter of 1943, oleomargarine sales were 163,837,901 lb., up 70 percent above sales in the first quarter of 1942.

Fruits, frozen, in storage on April 1, 1943, totaled 123,421,000 lb., compared to 119,982,000 lb. on April 1, 1942, and to a 1938-1942 April 1 average of 100,441,000 lb.

Vegetables, frozen, in storage on April 1, 1943, totaled 67,424,000 lb., compared to 61,781,000 lb. one year earlier.

Butter, creamery, in storage on April 1, 1943, was 16,402,000 lb. The quantity a year before was 45,045,000 lb., and the April 1 average in 1938-1942 was 31,352,000 pounds.

Cheese, all kinds, in storage on April 1, 1943, totaled 77,783,000 lb., compared to 190,158,000 lb. on April 1, 1942, and to an average of 106,830,000 lb. in 1938-1942 for the date.

Eggs, case equivalent, in storage on April 1, 1943, amounted to 5,834,000 cases. The figure a year before was 4,662,000 cases and the average for April 1 in 1938-1942 was 3,214,000 cases.

Poultry, frozen, all kinds, in storage on April 1, 1943, totaled 58,173,000 lb. The figure for April 1, 1942, was 139,677,000 lb., and the April 1 average in 1938-1942 was 110,365,000 pounds.

Meat, all kinds, in cure and frozen storage on April 1, 1943, totaled 778,999,000 lb., compared to 864,075,000 lb. on April 1, 1942, and to an average for April 1 in 1938-1942 of 790,846,000 pounds.

Lard in storage on April 1, 1942, totaled 120,240,000 lb. and rendered pork fat on the same date totaled 7,504,000 lb. The total for the two products a year earlier was 182,004,000 lb. and the average for the two products in 1938-1942 was 204,007,000 lb. for the date.

Weekly wholesale food price index of Dun & Bradstreet stood at $4.10 on May 11, unchanged from the previous month and comparing to a figure of $3.68 a year earlier.

Business activity index of *Business Week* was 204.5 on May 8, 1943, compared to 203.7 a month before and to 179.0 for the corresponding 1942 date.

OF course, Fairbanks Scales are big, husky, and accurate. You have a right to expect these things in *any* good scale — and particularly of Fairbanks Scales with the world's broadest scale manufacturing experience behind them.

The feature about Fairbanks Scales that may surprise you the most, is their ability to do things you *don't* expect of scales.

Here are a few of many jobs done by Fairbanks Scales:

- They count small parts — more accurately than manual counting
- They weigh carloads of coal in motion and make a printed record of each weight
- They control automatically paint ingredients
- They automatically control aggregates
- They "keep the books" in steel plants, making printed records of incoming and outgoing shipments
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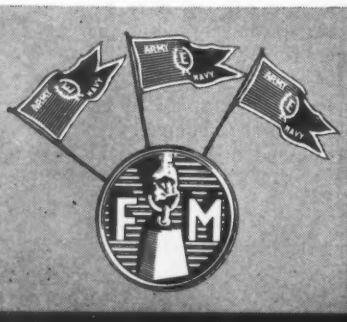
- They record the *flow* of liquid chemicals
- They guard secret formulas in compounding
- They control batching in bakeries
- They prevent disputes by eliminating the human element in weighing.

AND all of these things, only the beginning of the story, they do automatically and mechanically thereby eliminating human errors.

How Fairbanks Scales can be fitted into your production flow to speed up operations and eliminate errors may prove to be the most interesting discovery you ever made. Investigate now. Write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Illinois.



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INDUSTRIES

Blanton Co., St. Louis, Mo., manufacturer of vegetable oil products, has obtained priorities to begin construction of a soybean crushing plant with an initial capacity of 3,000 bu. of soybeans daily.

Borden Co.'s glamour cows, Elsie, Elmer and Beulah, are being portrayed in the first of a series of patriotic posters distributed to grocers throughout the United States, in a drive to help war bond sales, the national nutrition campaign and other activities.

Dixie Frosted Foods Co., Birmingham, Ala., has established a new fruit and vegetable freezing plant in Georgiana, Ala.

Florida Dehydration Co.'s new $125,000 dehydration plant at Zellwood, Fla., was recently destroyed by fire which started in the heating chambers of the drying room in the first test run.

General Foods Corp., New York, N. Y., continuing in line with its expansion program, has acquired Gaines Food Co., Inc., one of the largest manufacturers of dog food.

General Mills, Inc., Minneapolis, Minn., has published a 24-page booklet entitled "Safety Guide for the Farm and Home Front," suggesting various ways to help prevent accidents on farms, as one way of insuring adequate food production.

Henry Heide, Inc., New York, N. Y., manufacturer of a powdered lemon juice included in Army Field Ration K, Rodney Milling Co., Kansas City, Mo., Cracker Jack Co., Chicago, Ill., and the Tulare, Calif., plant of Golden State Co. have been awarded the Army-Navy "E" for excellent achievement in production.

Pasco Packing Association, processors of canned citrus products, has completed construction of a new concentrate plant at Dade City, Fla. At present, it has a daily production capacity of 7,000 gal. of orange concentrate.

Phillips Packing Co., Inc., Cambridge, Md., has purchased T. Milbourne Bramble canning plant, bringing the total number of plants owned and operated by Phillips to 20.

R. D. Pringle Co., Denver, Colo., is installing a quick freezing plant in Ogden, Utah, for freezing fruits and vegetables. The plant expects to process 10,000 tons of fruit this year and plans to begin operation with apricots.

Pratt Food Co.'s cereal mill in Buffalo, N. Y., was destroyed by fire, the damage amounting to $125,000.

LEWIS W. WATERS

General Foods Corp., New York, N. Y., recently appointed Lewis W. Waters, vice-president in charge of research and development, to the newly created office of vice-president in charge of scientific relations. The establishment of this new post is in recognition of the importance of a scientific approach to nutrition as differentiated from commercial research activities.

HOWARD B. CUNNINGHAM

Formerly manager of the purchasing department, Howard B. Cunningham has been appointed vice-president of National Biscuit Co., New York, N. Y. Mr. Cunningham joined the company in 1930 as a buyer of flour, shortening and other materials and has had a great deal of experience in the flour milling business, having started his career in 1913.

Modern Maid Food Products, manufacturers of prepared mixes, has introduced a new product known as "Redi-Breader," a breading mixture, for restaurant, hotel and institutional trade.

National Dairy Council, Chicago, Ill., is now showing two motion pictures, "More Life in Living" and "America Learns to Fly," as an answer to the many pleas for more information on the food values of dairy products and their relation to better health.

HANFORD MAIN

Loose-Wiles Biscuit Co., Long Island City, N. Y., has elected Hanford Main, executive vice-president, to the office of president, succeeding Bert L. Hupp, who becomes chairman of the board. Mr. Main has been with "Sunshine" since 1910, when he became a buyer in the St. Louis bakery.

National Sugar Co., Ltd., will begin production of beet sugar in Quebec, Canada, with a capacity of 36,000,000 lb. a year.

Union Securities Corp., New York, N. Y., has recently acquired Colorado Milling & Elevator Co., Denver, Colo., Guy A. Thomas and Frederick W. Lake have been named president and executive vice-president, respectively.

United Fruit Co., New York, N. Y., recently signed a contract with the Dominican Republic for the construction of port facilities and railway lines, enabling the Republic to develop certain areas in the West Indies at the termination of the war.

PERSONNEL

Dr. Paul M. Althouse and **Dr. Mitchell G. Vavich** have been appointed instructor and National Canners Association Research fellow, respectively, in the Department of Agricultural and Biological Chemistry at Pennsylvania State College, State College, Pa.

James J. Cuff, formerly head of Cuff Packing & Provision Co., Buffalo, N. Y., has been made general manager of Danahy Packing Co., Buffalo. Mr. Cuff has also been associated with Swift & Co.

The

HAM BEETLE

He's usually carnivorous, devouring other insects—but he also enjoys a meal of meats or cheese.

FUMIGATE

Properly applied HCN gas is an effective fumigant for control of this and other insect and animal pests. Call on your local Pest Control Operator for a well planned fumigation program.

We have a book containing interesting information about pests and their control by fumigation. Just drop us a line on your letterhead and we will be glad to send you a copy. E. I. du Pont de Nemours & Company (Inc.), Electrochemicals Department, Wilmington, Delaware.

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T. E. MILLIMAN

One of the nation's foremost agricultural executives, and chief agronomist at Co-operative G. L. F. Exchange, Inc., T. E. Milliman of Ithaca, N. Y., becomes vice-president and general manager of Seabrook Farms and Deerfield Packing Co., Bridgeton, N. J.

CARL F. HUTTLINGER

American Sugar Refining Co., New York, N. Y., has announced that Carl F. Huttlinger has been named vice-president in charge of refinery operations. Mr. Huttlinger has been with the organization in various capacities relating to refinery operations since 1912.

Robert M. Davidson has been elected president of Sanib Corp., New York, N. Y., manufacturer of Banatose and other dehydrated products.

Whitney Eastman has joined General Mills, Inc., Minneapolis, Minn., as an executive in the field of special investigation and research. Previous to his appointment he was vice-president and director of Archer-Daniels-Midland Co., Milwaukee, Wis

James Flood, sales manager of consumer yeast products for Standard Brands, Inc., New York, N. Y., has been granted leave of absence to join the executive staff of Smaller War Plants Corp. as assistant to the director of field operations.

Robert T. Hackett, who has been with Rumford Chemical Works, Rumford, R. I., for 21 years, has been appointed sales manager of the Richmond, Va., district of Rumford.

Florence Hall, who has been an extension agent working in the twelve northeastern states since 1928, becomes head of the Women's Land Army activities in the extension service. Miss Hall has worked with farm organizations, women's clubs and consumer groups as well as with extension groups.

W. H. Hunding, vice-president of Hunding Dairy Co., in Chicago, Ill., was elected president of Associated Milk Dealers, Inc.

William E. Johnston has been appointed New England district sales manager of American Sugar Refining Co., New York, N. Y., succeeding W. Van W. Warren, who resigned. He has had wide experience in the sale and distribution of refined sugar.

F. D. Machon, of Durkee Famous Foods, Chicago, Ill., was elected chairman of the Midwest section of American Association of Cereal Chemists for the coming year. F. C. Buzzelle becomes vice-chairman.

Dr. Richard C. Nelson of the University of Minnesota has joined the staff of Citrus Concentrates, Inc., Dunedin, Fla., to assist in the development of pectin and pectic derivatives during the war emergency.

William F. Robertson has resigned as manager of Trufruit Syrup Corp., Brooklyn, N. Y., to become research associate in the Division of Horticulture, Michigan State College, East Lansing, Mich.

Thomas B. Terry, president of Evans-Terry Co., Laurel, Miss., recently has been named a member of the Food Distribution Administration wholesale industry advisory committee.

Harold R. Weber of J. M. Smucker Co., apple butter packers and fruit preservers in Orville, Ohio, has joined the distribution branch of the processed foods division of OPA.

W. J. Williams, secretary, and **P. H. Littlefield**, treasurer, have been appointed vice-presidents of Canada Dry Ginger Ale, Inc., New York, N. Y.

DEATHS

Charles F. Hack, 75, founder and president of Home Dairy Co., Flint, Mich., recently, in Flint.

James J. O'Brien, 46, sales manager for National Biscuit Co., New York, N. Y., May 12, in Elizabeth, N. J.

Patrick J. O'Hara, 57, senior member of O'Hara Bros., Inc., Boston, Mass., and one of the most prominent men in the New England fisheries industry, May 8, in Boston.

Thomas A. Moore, 64, manager of the Detroit plant of Armour & Co., April 25, in Evanston, Ill.

Benjamin C. Nott, 62, chairman of the board of directors of W. R. Roach & Co., Grand Rapids, Mich., and former president of National Canners Association, recently, in Grand Rapids.

Albert T. Rohe, retired vice-president of Rohe & Brother, New York meat packers, and former president of American Meat Packers Association, recently, in Brooklyn, New York.

Paul Rogers, 49, president of Pangburn Candy Co., Fort Worth, Tex., April 27, in Fort Worth.

Fred J. Witte, 69, founder and retired president of Witte Beverage Co., Brooklyn, N. Y., April 29, in Amityville, L. I.

ASSOCIATED INDUSTRIES

American Cyanamid Co., New York, N. Y., announced that Dr. Walter S. Landis, vice-president of the company, has been awarded the Gold Medal of the American Institute of Chemists, in recognition of his contributions to chemical engineering and his development work in the field of nitrogen derivatives.

B. F. Goodrich Co., Akron, Ohio, has introduced an additional conservation program known as "The Cooperative Tire Conservation Plan." This plan fills a recognized need for servicing localized haulers, and provides for personalized inspection of every unit.

Diversey Corp., Chicago, Ill., has elected Lewis Shere, formerly director of research, to the presidency of the company, succeeding H. W. Kochs, who becomes chairman of the board.

Johnston & Jennings Co., Cleveland, Ohio, manufacturers of tank fittings and industrial stokers, has purchased the exclusive manufacturing and sales rights of "Rusta-Restor," an electrical process preventing the formation of rust.

Thresher Varnish Co., Dayton, Ohio, a subsidiary of Pittsburgh Plate Glass Co.; the Bridgeport and Boston works of Manning, Maxwell & Moore, Inc.; B. F. Goodrich Co.'s Los Angeles, Calif., plant; the Manville, N. J., factory of Johns-Manville Corp.; the Bethlehem, Pa., plant of Sarco Co., Inc.; Union Metal Manufacturing Co., Canton, Ohio; and Foxboro Co., Foxboro, Mass., have been presented the Army-Navy "E" award for excellence in production.

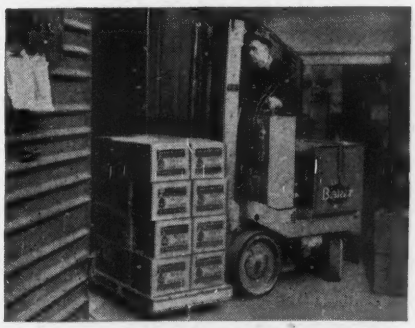
Union Bag & Paper Corp., New York, N. Y., has announced that Henry P. Carruth, formerly vice-president of Brown Co., Berlin, N. H., will shortly join the company as executive vice-president.

Tiering cartons on pallets three high with Baker Fork Truck to conserve storage space.

Tiering on racks allows access to underneath pallet load with Baker Fork Truck.

BAKER TRUCKS selected by Sherwin-Williams for model Chicago Warehouse

Horizontal storage on racks allows removal of single drums without disturbing drums above.



Box car or truck loading is speeded by handling pallet loads with fork truck.

When Albert Kahn designed the huge new Chicago warehouse for the world's largest paint manufacturer, no effort was spared to made it the last word in practical efficiency.

Since all of the operations in a warehouse involve material handling, it is highly significant that Baker Trucks and Tractors were specified to play the major role. Drag chain conveyors supplement the trucks to provide one of the most flexible mechanical handling systems of its kind yet developed.

BAKER INDUSTRIAL TRUCK DIVISION
of the Baker-Raulang Company
2145 West 25th Street, Cleveland, Ohio

In Canada: Railway and Power Engineering Corporation, Ltd.

FACTS AND FIGURES

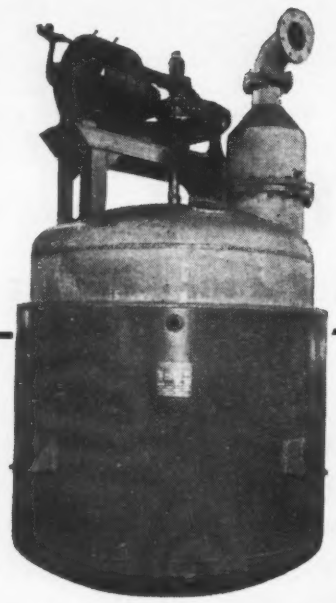
- Warehouse occupies space 288 x 624 ft.
- Has accommodations for 8 railroad cars and 20 highway trucks within building.
- Handling equipment includes fork truck and pallets, tractor and trailers, and conveyors.
- Packages comprise 50 and 30 gal. drums, 5 gal. pails and a wide variety of smaller units in cartons.
- Smaller items alone arrive from production at rates up to 60 per minute.
- More than 10,000 different items are received, sorted, stored, and shipped.

3001-1A-43

Baker INDUSTRIAL TRUCKS

FABRICATED OF STAINLESS STEEL

—to meet the exacting needs of the food industry

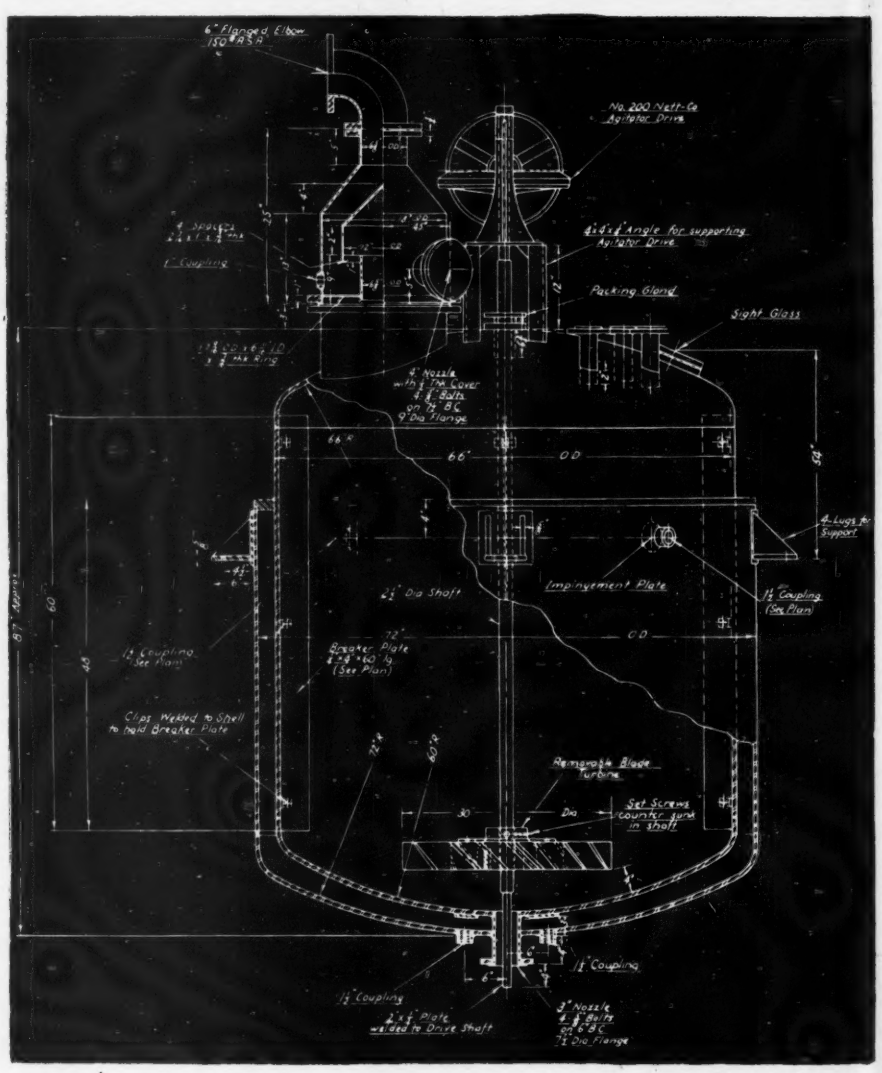


PATTERSON STEAM-JACKETED MIXING KETTLE

—A special type jacketed kettle fitted with a turbine-type mixer, constructed throughout of No. 316 stainless steel. Shell and heads constructed of stainless steel ⅝" thick. Steam jackets of carbon steel. Built for a working pressure of 75 lbs.

A.S.M.E. APPROVED DRAWING →

—This type of kettle may be adapted to straight mixing, or to a combined mixing and simple distillation problem. The vapor-dome is ideal for separating entrained moisture from a distillate vapor.


6" Flanged Elbow (ISO/R.S.A.)
No. 200 Nett-Ge Agitator Drive
4 x 4 x ¼ Angle for supporting Agitator Drive
Packing Gland
Sight Glass
4" Nozzle with 1" Pipe Cover & 4 Bolts on 7½" B.C. 9" Dia. Flange
66"
66" O.D.
4 Lugs for Support
2½" Dia. Shaft
Impingement Plate
1" Coupling (See Plan)
1" Coupling (See Plan)
Breaker Plate 8'-8" Dia. by ¼" (See Plan)
Clips Welded to Shell to hold Breaker Plate
87" Approx.
60"
Remograph Blade Turbine
30" Dia.
Set Screws Counter Bored in Shaft
1" Coupling
1" Coupling
3" Nozzle & 4 Bolts on 6" B.C. 7½" Dia. Flange
¼" Plate welded to Drive Shaft

FACED WITH A TOUGH DEHYDRATION PROBLEM?

Call in Patterson-Kelley engineers. In step with the rapid development of food dehydration, we offer a complete line of kettles, cookers, mixers.

EST. 1880

PATTERSON-KELLEY HEAT EXCHANGE ENGINEERS

THE *Patterson-Kelley* CO., INC.

114 WARREN ST., EAST STROUDSBURG, PA.

MANUFACTURERS FOR THE FOOD AND PROCESS INDUSTRIES

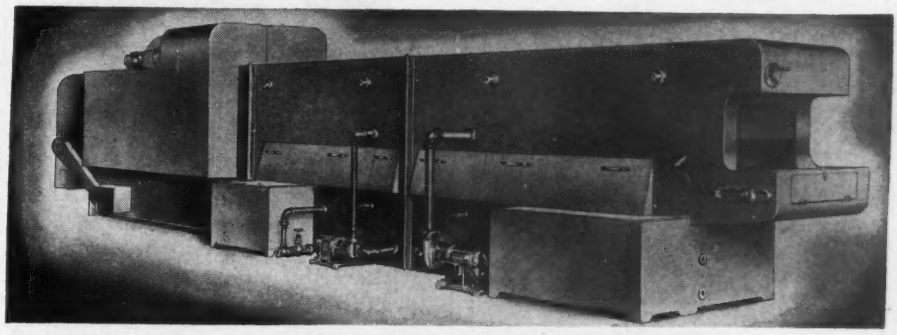
FOOD EQUIPMENT NEWS

Cleaning Machine for Dehydrater Trays

AMERICAN FOUNDRY EQUIPMENT CO., Mishawaka, Ind., has brought out a conveyor type spray machine for cleaning dehydrater trays. It is designed for the automatic cleaning of trays constructed of any metal. The unit was adapted from a machine originally designed for the cleaning of pans and tins in the bakery. A standard machine, it can perform such operations as washing; or washing and rinsing; or washing, rinsing and drying. When used for the washing of trays that have been in contact with acid fruit juices, a pre-rinse is built into the machine for flushing these out, thus increasing the life of the washing solution.

In operation, trays are fed onto the conveyor at the loading end. They are then automatically carried to the washing, rinsing and drying operations. In the washing compartment high pressure sprays remove all baked-on residue and foreign matter, while in the rinsing compartment the rinse removes all traces of the washing compound. In the drying compartment, excess liquid is blown off and evaporated, while the remain water film is dried off the trays. The machine then automatically discharges the trays, ready for immediate re-use.

This machine is equipped for heating the solution tanks with steam, gas or electric heating and is supplied with complete controls. Special combinations of straining devices are provided to prevent clogging and permit cleaning of the strainers without shutting down the machine. Sprays are supplied from centrifugal pumps. Variable speed permits adjustment of the machine to suit variations in production.

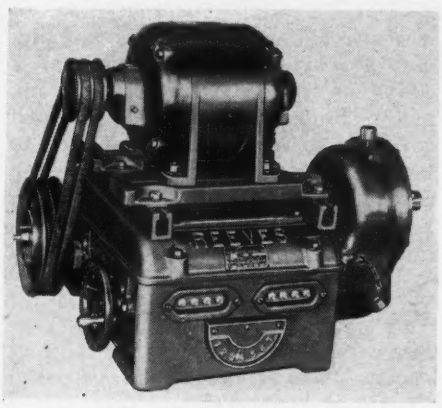


Conveyor type spray machine for cleaning food dehydrater trays.

Speed Controller and Reducer

REEVES PULLEY CO., Columbus, Ind., has developed a line of variable speed control equipment consisting of a standard variable speed transmission with built-in speed reducer. The device is designed to give accurate speed control and speed reduction combined in a single, completely inclosed unit. Less mounting space is needed to obtain the lower range of speeds than is the case when auxiliary speed reducing equipment is used for that purpose.

This transmission is available in both horizontal and vertical designs, for mounting in any convenient position. Each design is available in a wide range of speeds and in capacities from 1 to 7½ hp. inclusive. The variable speed transmission in various sizes produces ratios of speed variation from 2:1 through 12:1, and the reduction gears provide ratios up to and including 6.9:1.



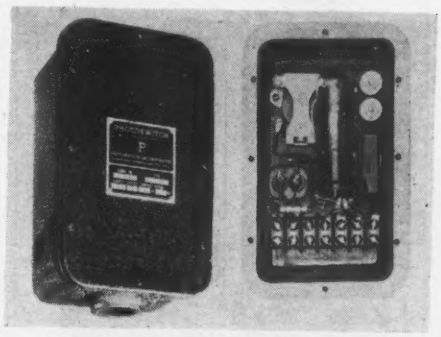
Transmission unit combining variable speed transmission and speed reducer.

Speed changes are made by a handwheel or, where automatic regulation is desired, by mechanical or hydraulic methods. Where individual motor drive is used, the motor may be mounted on a base provided directly on top of the transmission. This base will accommodate any standard motor of suitable horsepower for the capacity of the transmission. Connection between motor and transmission may be by silent or roller chain, by V-belts, or by gear and pinion.

Electronic Level Control

PHOTOSWITCH INC., Cambridge, Mass., has developed a line of electronic level controls designed particularly for mounting in hazardous locations. These are supplied for use with conductive liquids of an explosive nature.

There are two models, Type P15NHX for high level control and P15NLX for low level control. Each is furnished as a complete unit in a vapor-proof cast iron housing for direct tank installation. A one-inch nipple screws into the hub at the bottom of the control housing and is screwed into a one-inch flange on top of the tank. From the control, a probe rod projects through the nipple and into the tank to the desired depth.



Electronic liquid vapor control

High level control is accomplished when liquid rises and contacts the probe tip; low level control, when liquid drops below the probe tip. Both models incorporate a safety feature providing for operation of the relay in case of current or tube failure. These controls are available for operation on 230, 208 or 115 volt a.c., 60 cycles.

Vacuum Pump

A POSITIVE-TYPE vacuum pump for production and laboratory applications has been announced by American Automatic Typewriter Company, 614 North Carpenter St., Chicago. Available in two standard sizes, this pump is supplied with individual electric motor drives or without motors for use with any available power source.

The pump employs four bellows mounted within a square wooden frame, connected to each other and to the pump outlet by a channel running through the frame. These bellows,

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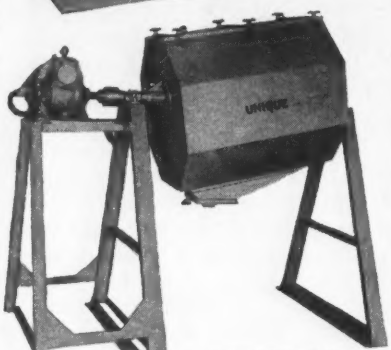
Robinson Engineers are at your service! Avail yourself of their experience and of the facilities of our modern testing laboratory. Illustrated catalogs on request for any "Unique" equipment.

"Unique" Saw Tooth Crusher. Special grade steel saws, mounted in roller bearings. Heavy-duty balance wheel carries intermittent shock load.

"Unique" Jr. Disc Grinder. Built-in direct-drive motor. Shown equipped with jacket for hot or cold water or steam and mounted on steel base.



"Unique" Tumbling Prism Mixer. Driven by gearhead motor. For handling dry powders that cannot stand much agitation. All-steel welded frame.

"Unique" Gyro-Sifter. Motor driven. With telescopic hopper for efficient, continuous feeding of dry powders.

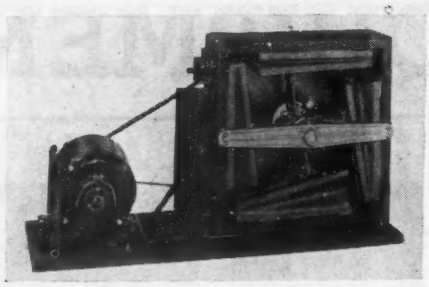
"Unique" Mixer. All-steel welded . . . extra large. Equipped with cold water jacket, mixing inlet and two inspection doors. Solid stainless steel construction.

Firms with war contracts have immediate priority on our complete engineering and manufacturing facilities.

ROBINSON MANUFACTURING COMPANY

WORKS: MUNCY, PA.

30 CHURCH STREET, NEW YORK



Positive type vacuum pump of small size for production or laboratory use.

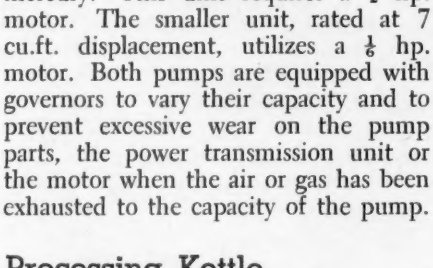
which are successively expanded to exhaust air or gas from the equipment to which the pump is connected, are driven by a revolving shaft through connecting straps. The shaft is driven by a V-belt at a relatively low speed approximating 200 revolutions per minute and is said to give smooth, quiet running and low maintenance cost. The flexible sides of the bellows are made of leather, as are the intake and exhaust valves. Joints are gasketed by a sheet of neoprene cloth, and the frame or case of the unit has a black finish.

The larger of the two units is rated at 15 cu.ft. displacement at 4 in. of mercury. This unit requires a ½ hp. motor. The smaller unit, rated at 7 cu.ft. displacement, utilizes a ⅙ hp. motor. Both pumps are equipped with governors to vary their capacity and to prevent excessive wear on the pump parts, the power transmission unit or the motor when the air or gas has been exhausted to the capacity of the pump.

Processing Kettle

FOR MIXING or processing thick, heavy or viscous materials, creams or pastes that must be heated and that have a tendency to settle or cake at the bottom, or to adhere to the sides of the processing vessel, a special kettle has been designed by L. O. Koven & Bro., Inc., Jersey City, N. J.

The kettle is made of steel, stainless steel, or any other metal desirable for the material being handled. It is of A.S.M.E. type all-welded construction. A full steam or hot water jacket is provided for heat supply. The motor driven mixing and scraping mechanism consists of a U-shaped paddle agitator that, in rotating, removes the material from the sides and bottom of the vessel, throwing it back toward the center. This, plus the action of oblique blades supporting the U-shaped paddle, and shearing through the contents, gives a uniform kneading and dispersion. Constant removal of the material from the sides and bottom prevents caking and overheating, and promotes thorough and fast heating of the product.

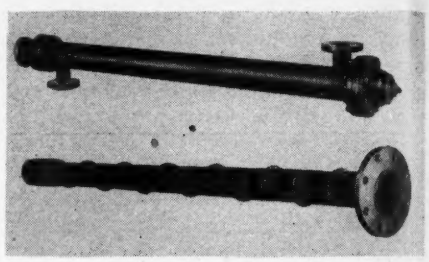


Mixing kettle for thick or viscous materials.

The kettle is provided with a vapor-tight, bolted cover. There are also two large, hinged, swing-bolted manhole covers for easy opening and closing; two sight glasses; and a flanged pipe connection for introducing liquids to the mixture.

Heat Exchangers

DOWINGTOWN IRON WORKS, Downingtown, Pa., has developed a line of "Shellfin" standardized heat exchangers. These are said to be suitable for most purposes and are built on a production basis. With only minor changes in basic construction, such as baffle spacing and length combinations of units, these exchangers can be used for many forms of heat exchange between two fluids in medium temperature ranges where the temperature of one fluid materially exceeds that of the other. They are suitable for application to such processes as cooling, heating, condensing and evaporating.



"Shellfin" heat exchanger above, with tube unit below.

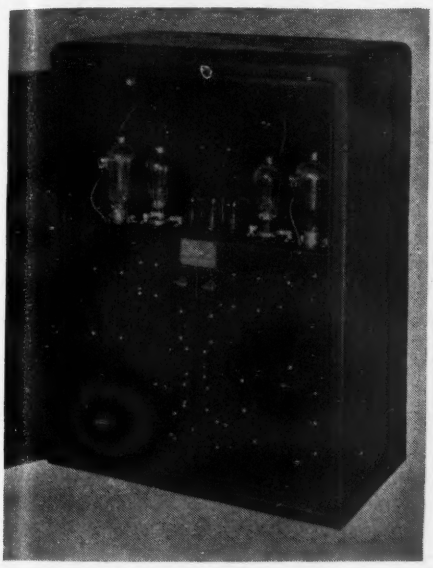
Advantages claimed by the makers for these heat exchangers include: Standardized construction that avoids much preliminary engineering; standardized performance and pressure curves; and ease of unit selection.

Electronic Drive

FOR APPLICATIONS on industrial drives, such as conveyors and processing equipment, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., recently announced an electronic adjustable speed drive.

Called the "Mot-O-Trol," this drive provides close speed regulation over a 20 to 1 speed range for d.c. motors operating from an a.c. source. Features

of the drive include stepless speed control, automatic close speed regulation over wide load fluctuations, full torque at extremely low speeds, smooth stepless acceleration and deceleration, and dynamic braking. At present, a standard drive is available for ratings up to 1 hp. for single phase operation on 110 or 220 volt, 60 cycle systems. Special drives of larger horsepower rating can be designed to suit particular application requirements.



Electronic control cabinet used with the "Mot-O-Trol" adjustable variable speed drive.

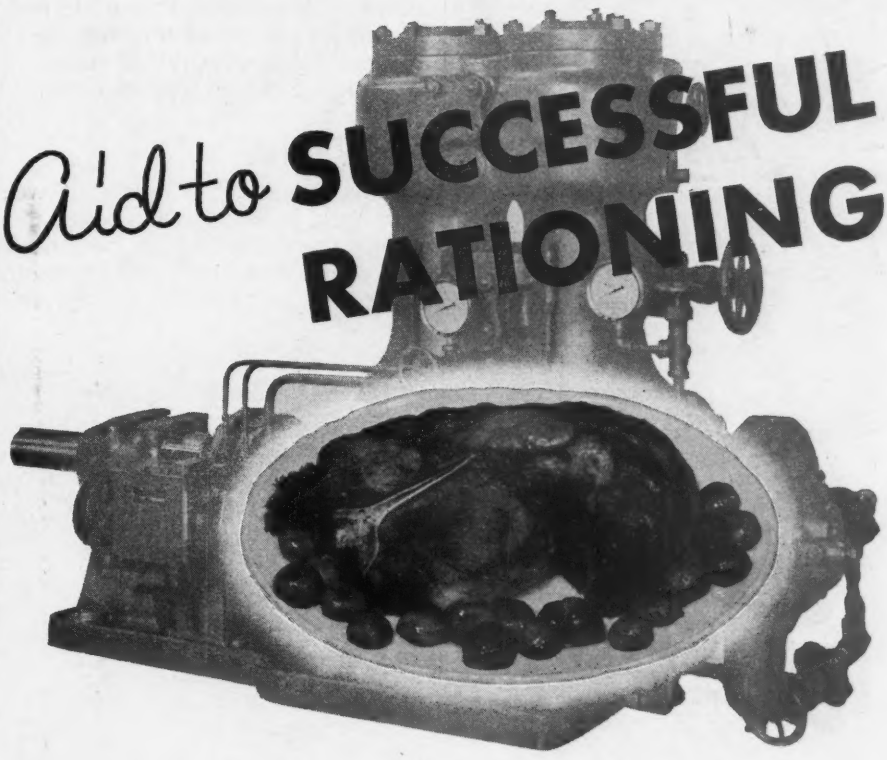
There are four parts to this drive, including: (1) Power transformer for separate mounting, (2) "Mot-O-Trol" cabinet with thyratron tubes, and current limiting and speed regulating control, (3) control station with potentiometer to vary the voltage supplied to the armature and field circuits, equipped with start and stop push buttons, (4) shunt wound d.c. motor.

The standard "Mot-O-Trol" is designed to regulate automatically a preset motor speed so as to maintain essentially constant speed regardless of load. The d.c. voltage output of the main rectifier tubes is controlled by small tubes to compensate for speed changes. For a speed range of 10 to 1, with torque varying from no load to full load, speed will not vary more than 4 percent from a preset value. Maximum variation for the 20 to 1 speed range is within 8 percent. No rotating part except the d.c. motor is required, and no separate line starters or field rheostats are necessary.

Fire Extinguisher

In conformance with the emergency requirements growing out of the war, American-LaFrance-Foamite Corp., Elmira, N. Y., has designed a pump tank

Food is a WEAPON and REFRIGERATION *makes it Mighty*



It's significant that most of our Rationed Food is perishable. It must NOT spoil or be wasted for it's the lifeblood of the "production army" that supplies fighting armies with the means to victory.

On America's MECHANICAL REFRIGERATION depends the success of our food program from food in the field thru processing, distribution, and final home storage by Ration Book holders.

Your Refrigeration will be called on for greater capacity, continued peak efficiency with the least possible amount of service attention and repair. We, at Vilter, offer you the engineering skill and knowledge to help you obtain the MOST out of your equipment — at the least cost. Can we help you?

VILTER FRIGID BLAST FREEZERS . . .

Typical of Vilter pioneering in faster, more economical food freezing. Custom-engineered to your needs.

Small Model B Unit using open-end trucks moved against FRIGID BLAST Blowers.

ARMY-NAVY "E"
Awarded to Vilter for Outstanding War Production.

Superior Since 1867 VILTER Air Conditioning Refrigeration . . .

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The quality trade in potato chips is *yours* when you install the modern

FERRY CONTINUOUS POTATO CHIP MACHINES

Competitors who adhere to the old time methods of cooking, simply can't produce the superior, uniform quality potato chips which are turned out *continuously* by a FERRY machine.

None of the chips are underdone, burnt, rancid or greasy and the actual cost per pound to you is much less than is possible by any other method.

Made in 6 sizes, with capacities from 50 to 350 lbs. of finished chips per hour.

Write today for complete information. Just ask for Bulletin F.I.

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CAN WASHING MACHINERY

fire extinguisher with the amount of critical materials needed at a minimum. This tank produces a straight and constant stream, not a spray, in compliance with OCD requirements for controlling incendiary bomb fires. It is made in 5 gal. and 2½ gal. sizes, has a range up to 40 ft., is equipped with a standard 26 in. hose, and is a self-contained unit.

Paper Caps

ALDINE PAPER CO., 373 Fourth Ave., New York, is making a washable paper cap for women workers in food plants and other industrial establishments. These caps are made from a vegetable

Paper cap for female factory workers.

fiber paper product and can be stitched, washed and ironed like fabric caps. The paper is porous enough to permit the passage of air and hence the caps are said to be cool to wear. In addition, they are inexpensive and may be disposed of after use although they can be washed for re-use if desired.

Glass for Dehydration Equipment

PITTSBURGH PLATE GLASS CO., Grant Building, Pittsburgh, Pa., recently announced a special glass for use in the construction of dehydration equipment. Produced by a process called "Herculiting," this is a specially heat treated glass available both in transparent and opaque types. The strength of the new glass is said to be four times that of ordinary glass of the same thickness. It can be made in various shapes and forms, including bent shapes, disks, narrow strips and flat plates. It performs without trouble under all temperatures encountered in dehydrating plants and will withstand constant temperatures up to 650 deg. F. without effect. It can also withstand equally well sudden variations in temperature.

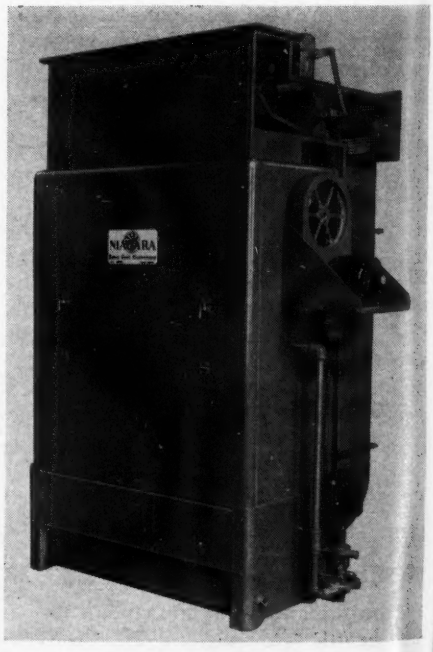
Advantages of this material in dehydration and other processing work arise from the fact that it is immune to the effect of all the food acids, fumes and other corrosive ingredients that might be found in the food plant. In addition, its impervious surface aids in ease of sanitation in the food plant.

Evaporative Cooler Control

A NEW METHOD of automatic temperature control for "Aero" heat exchangers when used for cooling liquids has been developed by Niagara Blower Co., 6 E. 45th St., New York.

This method is based upon control of the amount of outside air passed through the evaporative cooling chamber and replaces control by altering the flow of liquid being cooled. The method is said to improve accuracy, the cooling effect being directly proportioned to load changes, which gives a modulated, nearly straight line temperature control with no hunting action. The method is also said to save water, and when the heat exchanger is used to cool oils or compounds there is said to be no settling of solids, restricted flow or clogging of tubes to interrupt operations.

The apparatus consists of a recirculating air duct to which outside air is admitted by dampers controlled by a thermostat in the liquid line where it is in contact with the full flow of the liquid being cooled. Only the minimum amount of outside air is admitted, keeping spray water temperature above freezing to prevent damage in cold weather. The method is patented.



Evaporative heat exchanger equipped with a new method of temperature control.

Vegetable Peeler

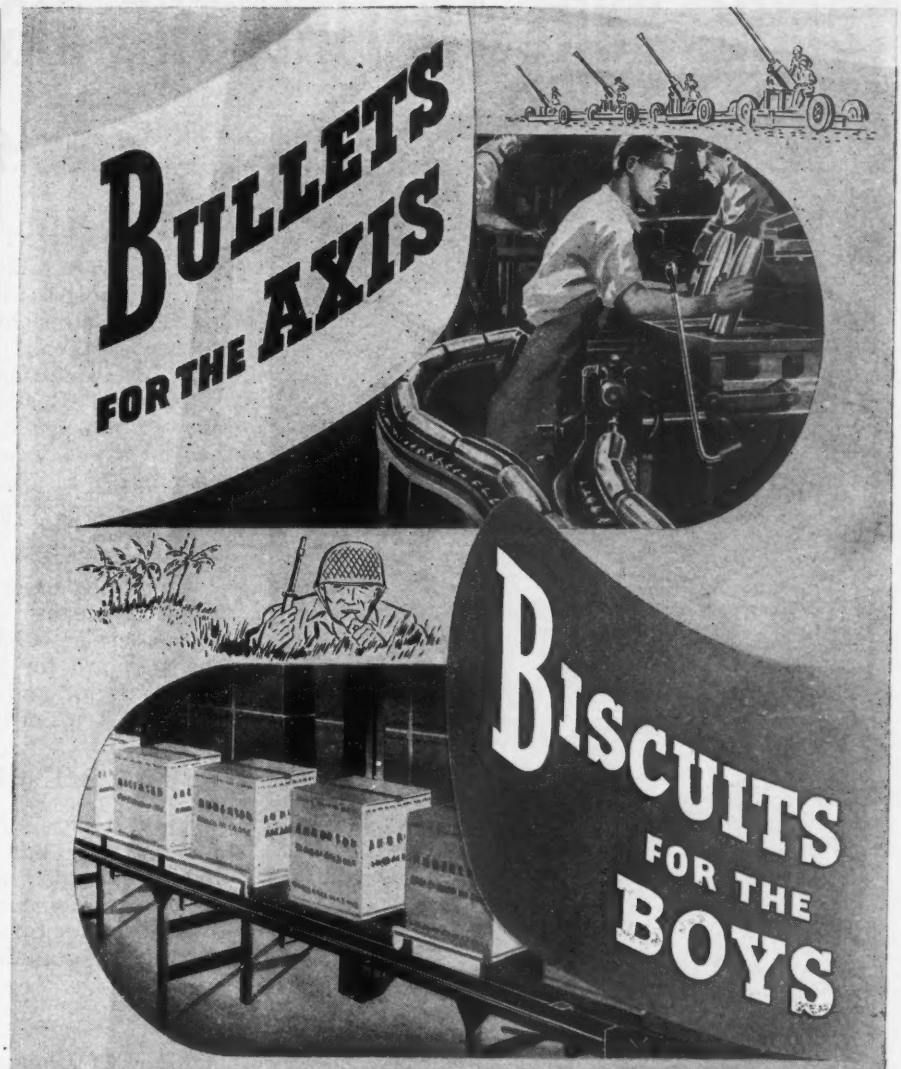
ROBINSON BROS., 53 Clarke Ave., Jersey City, N. J., is supplying the "Viking" peeler for peeling vegetables in dehydration plants. This machine comes in three sizes, taking up to 30 lb., 50 lb. and 75 lb. per charge, respectively. Its operating parts consist

Vegetable peeler for dehydration plant.

of a cast iron peeling hopper and a revolving disk at the bottom of the hopper. The surfaces of those parts that come in contact with the vegetables are covered with carborundum grains fused directly to the metal. Charging is through the top. The revolving disk in the bottom causes the vegetables that are to be peeled to make continuous rolling contact with the abrasive surface. This removes the skin of all such vegetables as potatoes, carrots, turnips, and beets with a minimum of loss. Operation is through a V-belt connected motor or by pulley and belt.

Air Power Stacker

LEWIS-SHEPARD SALES CORP., Watertown, Mass., has brought out a portable elevator and stacker powered with an air motor. This device, which operates at the same air pressure as industrial overhead hoists, has been designed for use where organic dusts or other explosive atmospheres exist. It is provided with precise control so that the operator can use any speed of lifting or lowering between maximum top speed and zero. A "deadman" cable control stops the air motor and the platform as soon as the operator removes his hand from either one of the dual controls. These air power stackers are produced in the same speed and capacity as the company's standard line of electric power stackers. They also come in standard hinged and telescopic types.



...Even More Than in Peacetime—Industry at War Relies on Experienced Conveyor Engineering to Help Push Production

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In many war plants specially designed and built Standard power and gravity conveyors — shell conveyors, for example — are doing their part to maintain peak production. In essential industries, such as food products plants — process industries — Standard Conveyors are in greater use than ever — keeping production flowing. An extensive and varied experience record qualifies Standard Conveyor Company to render valuable aid and counsel to production and plant executives. Tell us what you handle — how much — how far — our recommendations will prove worth while.

A valuable reference book, "Conveyors by Standard" Catalog FI-6 will be included in response to your inquiry.

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YOU'RE SURE TO FIND THE RIGHT INSULATION *at Armstrong's*

WONDERING which type of insulation will be best for your low-temperature construction? Which will give the most economical service . . . which will be best for available refrigerating equipment . . . or which will fit your pocketbook? You'll get unbiased answers to these and other questions about insulation at Armstrong's—"Insulation Headquarters." And you'll be sure the answers are right, because Armstrong's engineers—backed by 38 years of experience—can offer this complete line of insulating materials.

CORKBOARD

Armstrong's Corkboard is recommended without reservation because of its record of dependability under severe service conditions. Corkboard—long regarded as the standard for low-temperature insulation—is light, strong, rigid, and is highly resistant to moisture and common forms of deterioration.

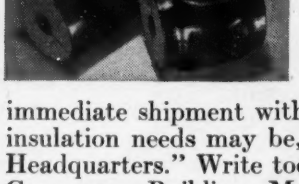
MINERAL WOOL BOARD

This structurally strong board is processed from mineral wool and suitable binders. It is an effective barrier to heat, has good moisture resistance, and is free from objectionable odors. Armstrong's Mineral Wool Board is self-supporting, will not settle, sag, or warp. It is especially recommended where original cost is a factor.

FOAMGLAS

Made of thousands of tiny glass cells, Armstrong's Foamglas is moistureproof and vaporproof. Hence, it holds its insulating efficiency permanently. Like other forms of glass, it will not burn. Foamglas is light, easily workable, and its average compressive strength of 150 pounds per square inch enables it to support heavy loads.

CORK COVERING



Armstrong's Cork Covering is available for insulating all sizes of cold lines and fittings. It fits accurately and provides lasting protection at any low temperature.

All Armstrong's Insulation Materials are available for immediate shipment without priority. So whatever your insulation needs may be, get in touch with "Insulation Headquarters." Write today to Armstrong Cork Company, Building Materials Division, 4206 Concord Street, Lancaster, Pennsylvania.

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BOOKLETS • LITERATURE • BULLETINS

FOOD PLANT EQUIPMENT

Drying Equipment—Eight types of vacuum dryers designed to effect rapid drying at a low temperature in a practical way through the use of steam coils, are described and illustrated in a 12-page catalog entitled "Vacuum Drying," issued by Ernest Scott & Co., Fall River, Mass.

Filters—"Quick Facts on Keeping Fluids Clean," is a 32-page catalog, containing factual information about Cuno filter installations applicable in food industries operations, burners and combustion controls, and descaling and cooling systems; issued by Cuno Engineering Corp., Meriden, Conn.

Heat Transfer Equipment—Specifications and dimensions of a series of shell and fin-tube coolers of the "Kramer Coolant" type are given in a 4-page bulletin, No. R-443, published by Kramer Trenton Co., Trenton, N. J.

Maintaining Bakery Equipment—Suggestions and recommendations on the care, maintenance and lubrication of bread wrapping, bread slicing and cake wrapping machines are given in the 16-page booklet entitled "Care and Maintenance of Wrapping and Slicing Machines for Bread and Cake," published by Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.

Transmission and Handling Equipment—A 180-page condensed and illustrated catalog of standard equipment containing representative types and sizes of power transmission and materials handling equipment has been issued as Catalog No. 850, by Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.

PLANT SUPPLIES

Electrostatic Heating—The 22-page catalog, "Thermex High Frequency Heating," which describes the industrial operation of high-frequency electrostatic equipment and its application in such operations as fabricating lumber, drying tobacco and destroying insects in infested grains and cereals, has been issued by Girdler Corp., Thermex Division, Louisville, Ky.

Lubricating Equipment—A 20-page catalog entitled "Food as Important as Bullets," describing methods of protecting equipment from rust and corrosion by proper lubrication, has been issued by Fiske Bros. Refining Co., Lubriplate Division, 129 Lockwood St., Newark, N. J.

Motor Control Guide—How to select and apply motor control is explained in the 16-page bulletin, GEA-4015, "Simplified Guide to the Selection and Application of Commonly Used Motor Controls," issued by General Electric Co., Schenectady, N. Y.

Steam Hose—Containing simple, easy-to-read rules for the care and maintenance of steam hose, as well as detailed instructions on the proper methods for attaching couplings, Catalog Section 4500, entitled "Steam Hose," has been issued by B. F. Goodrich Co., Akron, Ohio.

Variable Speed Transmission—Complete descriptions of speed reducer-type transmissions available in horizontal and vertical design, together with diagrams, engineering data and rating tables, are given in a 16-page illustrated catalog TR-432, published by Reeves Pulley Co., Columbus, Ind.

Welded Piping—A complete compilation of technical information on pipe welding, welding fittings and flanges has been incorporated in the 239-page leather-bound catalog and engineering data book entitled, "Tube-Turn Welding Fittings & Flanges," No. 111, issued by Tube Turns, Inc., Louisville, Ky.

CONTROL EQUIPMENT

Control Equipment—"Bristol's Metavane System of Pneumatic Telemetering" is a 4-page leaflet that describes and diagrams distant measurement of temperature, flow, pressure and liquid level for gases, steam and liquids; published by Bristol Co., Waterbury, Conn.

Control Equipment—"Synchronous Motor Driven Multi-Contact Timer" is the title of the 4-page bulletin B-3000 describing typical applications, construction, dimensions and standard features of these timers; issued by R. W. Cramer Co., Inc., Centerbrook, Conn.

Control Equipment—"Double Displacement Proportioning Equipment," Publication No. 4009, describing the principle of operation, advantages and applications of proportioning equipment of the double displacement type, has been published by Cochrane Corp., 17th & Allegheny Ave., Philadelphia, Pa.

Control Instruments—"Micromax Pneumatic Control" is the title of a 15-page catalog, N-00B, which describes the operation and use of pneumatic control equipment for pH, conductivity, temperature, and other variables; published by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.

Control Instruments—"Micromax" temperature recorders for use with thermocouples or with thermohn resistance thermometer bulbs are described in the illustrated Catalog N-33-163, published by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.

TRUCKS AND TRAILERS

Driving Manual—A description of the sound slide film entitled, "The Skill Behind the Man," issued as a training manual for tractor-trailer drivers, has been published by Fruehauf Trailer Co., 10939 Harper Ave., Detroit, Mich.

Truck Instructions—Instructions for women lacking previous mechanical training in handling electric industrial trucks are concisely given in a short pamphlet, "Lady Will You Give a Lift," published by Elwell-Parker Electric Co., 327 Union Bldg., Cleveland.

MISCELLANEOUS

Lighting—The publication "Verd-A-Ray," a 4-page descriptive catalog, giving various uses of a new form of light for use in all standard incandescent fixtures, to insure a minimum of eye and body fatigue in the home or in industry, has been issued by Save Electric Corp., Toledo, Ohio.

Lubrication Handbook—An indexed guide to better lubrication for increased war production, "Graphite Lubrication Handbook" explains the use of Cograph, a natural colloidal graphite, published by Nassau Laboratories, Inc., Hackensack, N. J.

Meat Production—To help step up beef output to meet wartime requirements, a 4-page bulletin, B-3101-1, describing typical applications of small and large portable motors in helping farmers to meet this year's quota, has been issued by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Research Laboratories—"Science at your Service" is the title of a 12-page booklet prepared for plant managers and technologists describing the scientific services offered by Food Research Laboratories, Inc., 48-14 33rd St., Long Island City, N. Y.

Shiftograph—A circular slide rule for use as a perpetual work-shift schedule, the "Shift-O-Graph" provides for several different plans of rotation whereby all workers share equally in desirable and undesirable work shifts; issued by George S. May Co., May Bldg., 2600 N. Shore Ave., Chicago, Ill.

Synthetic Rubber—An 8-page revised edition of the "Properties of Ameripol D," discussing the properties of this type of synthetic rubber, has been published by B. F. Goodrich Co., Akron, Ohio.

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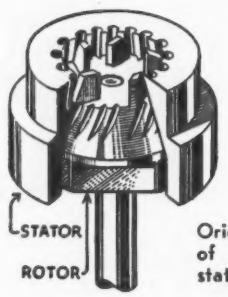

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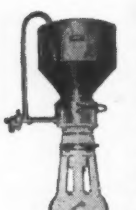

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Small Dehydrater For Vegetables

(*Continued from page 55*)

Cost of Dehydration

It is impossible to state specifically the time required for dehydrating the various vegetables. This factor will vary with the nature of the product, the style in which the product is subdivided, the size and thickness of the pieces and the temperature and humidity of the outside air. Snap bean sections, for example, have been found to require a longer drying period than spinach or carrots, and diced products a slightly longer time than slices of the same material. However, over a large number of experimental runs in the small dehydraters with normal tray loads of the various products, the average drying time has been found to be 10 hours, with variations of 2 hours in either direction. Fuel costs are figured on this basis.

Table II shows the comparative costs of dehydrating and canning vegetables with gas and electricity. It is impossible to compute fuel consumption with a coal or wood stove. In general, the total cost per unit quantity of material preserved is lower for dehydration than for canning, the cost using electricity being greater for both methods. Gas rates were based on those used in the Greater Boston area, and were computed at $1.35 per 1,000 cu. ft. Electricity rates were based on those in Amherst at $0.03 per kilowatt-hour. Data on canning costs were obtained from Benson (1939). Fuel costs for both methods include blanching and processing. The average weight of the total contents of a pint jar of the ordinary home canned vegetables was found to be 17 oz., with a drained weight of 14 oz. Comparative costs are figured on the drained-weight basis.

The cost of a pint jar for canning is figured at one-fourth the first-year price of the jar plus 1 cent for a jar ring. Total price for the container and ring is $0.03. Costs of dehydrated foods package are discussed in the following sections.

Notes on Packaging

Since dehydrated foods readily absorb moisture they should be packaged in moisture-proof, airtight containers as soon as possible after dehydration is completed. Many households possess jars for which new rings can no longer be obtained. These make excellent containers for dehydrated foods. Used jar rings which are no longer useful for canning, but which have not become hard and brittle, make very satisfactory seals under these conditions, and if necessary two may be used on each jar. When none of these are on hand, melted paraffin poured around the closure to make an airtight seal is also satisfactory. Heavy waxed-paper bags such as are used for potato chips and popcorn, which can be heat-sealed with a flat iron or curling iron, also make good containers. All types of containers should be packed as tightly as possible with the dehydrated product.

A pint jar or the usual size treated paper or cellophane container holds an average of 8 oz. of dehydrated product, which is equivalent to approximately 36 oz. of canned material. The cost of available paper on cellophane containers averages 1.5 cents, and is equivalent to the cost of using a pint jar for the same purpose. The containers should be stored in such a manner as to be protected from attack by insects and rodents. All containers should be stored in a cool, dark, dry place.

Conclusion

It should be stressed that small-scale dehydration is not something for experimentation in the home, but that it can be an important method of food preservation at the present time. The purpose of this paper has been to present recent available data on methods of home dehydration and details as to how a satisfactory home dehydrater may be constructed from noncritical materials. While it is quite unlikely that dehydration will ever supplant canning or freezing in the home preservation of food, there are definite indications that dehydrated food will find continued use in the postwar diet.

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Simple Technics Speed Training of Green Help

(Continued from page 74)

The Training Within Industry Division of the War Manpower Commission has an excellent ten-hour course for educating supervisors in job-instruction training, as well as other courses particularly valuable at this time. Subjecting the whole supervisory staff to such a course will pay dividends in stepped-up production.

Closely connected with the training program is the problem of the employee who has been considered permanent in the past. It is well to consider that all of the employees are temporary in order to insure top production of any plant. Instead of thinking in terms of persons, begin to think in terms of functions to be carried out. There are jobs which are filled in all plants by men who are thought to be indispensable. Many of these men do not have understudies who are capable of carrying out their functions, and now it is hardly possible to develop understudies to do this. It has taken a season or maybe more to train these indispensable men. If the problem of replacement is considered in terms of persons it is most discouraging. Begin now to view these complex jobs from an impersonal view, breaking the jobs down to the various functions and considering where, how and when these functions are performed. Consider also whether some of these functions cannot be done mechanically or by a clerk. When these functions are enumerated it does not seem as impossible to replace these skilled persons. A trained supervisor will be able to instruct a new employee in a skilled job in surprisingly short time if he is given the aid of this new viewpoint and an analysis of the job by functions.

It is also a good plan to select some experienced employees and have them take the course, too. They should already know the work and what is expected of those doing it. Have them instructed concerning what the new employee must be taught. Place these instructors in groups of new employees and let them show the group what they are to do.

Insist that these instructors follow an approved plan, incorporating the following steps:

1. Give the new employee the right mental attitude toward his work.

2. Tell and show the learner about the operation; instruct slowly and care-

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• Today packers and manufacturers of food products—dairies, meat packers and other important producers—are more careful than ever to prevent spoilage losses. The plain truth of the matter is that bacterial contamination hurts the war effort by detracting from the sum total of food production.

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HTH Hypochlorite solutions are an effective germicide for use on floors, in locker rooms and cafeterias.

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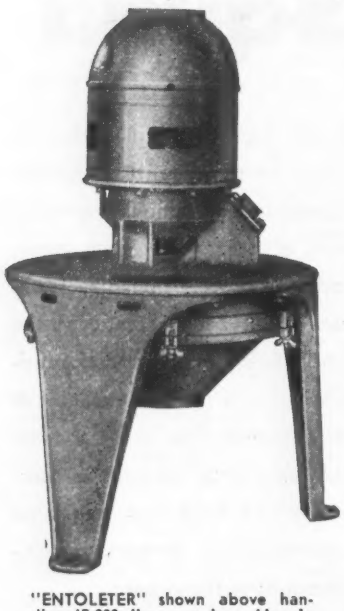

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fully; invite and answer questions.

3. Let the learner try the job; observe the performance and correct any errors at that time.

4. Leave the learner on his own and check frequently to observe progress until normal supervision is sufficient.

Such a procedure may seem to be complicated and unnecessary to those who have never considered it.

The definite results of this indoctrination course are reduction of the breaking-in time, better utilization of raw material and reduction of machinery breakdown, accidents and labor turnover. Other intangible results are an improvement in morale and an increased satisfaction of the employees with their work.

Training times of average workers have been reduced in one large plant from 4 to 6 months to 1 to 3 weeks. Another plant reports that a girl was trained in a job in a week, where previously it had taken a month to train a man. These training courses are giving an enormous acceleration to the war program.

Concentrating Citrus Juices by Vacuum

(*Continued from page 66*)

of citrus concentrates in the preparation of reconstituted fruit juice drinks, in which the concentrate is diluted to its original soluble solids content and consumed as a substitute for fresh or canned juice. This use increases the importance of controlling quality during manufacture, storage and distribution, and renews interest in the improvement of flavor by better manufacturing methods.

Until a method is developed for returning volatile juice-flavoring constituents, tested portions of vacuum-concentrated cold pressed peel oil should be added to citrus concentrates intended for use in preparing reconstituted juice. This offsets flatness without adding ingredients foreign to the fruit, although label declarations are required by food and drug regulations.

Reconstituted citrus juices may be bottled in equipment similar to that used for carbonated beverages. The concentrate, diluted with enough warm water to permit use in a siruper, is "thrown" in bottles which are then filled with hot water after which the bottles are capped and inverted to mix the concentrate and water, and pasteurize the product.

Another development in which concentrated citrus juice may play an important part is in the production of dehydrated juices. Lemon juice is now prepared in powdered form after mix-

ing with considerable portions of corn sirup or powdered milk. Various spreading agents are being investigated in an effort to develop a method for preparing powdered orange juice, probably using orange concentrate as the raw material and completing the dehydration in special equipment. Vacuum-concentrated essential oil will probably be added to the powder.

A patented use for orange concentrate is in combination with anhydrous dextrose, which will absorb 8 percent water of crystallization[8]. Four parts of anhydrous dextrose may be mixed with one part of 70-deg. Brix orange concentrate to make a solid product which may be used in confections, jelly powders, punches, fruitades or other products. Owners of the patent license it without royalty to manufacturers using their dextrose.

Summary

Methods for the vacuum concentration of citrus juices are described. Manufacturing costs are itemized and uses of citrus concentrates are discussed.

Acknowledgment

The author appreciates the helpful suggestions made by H. W. von Loesecke.

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BOOKS

Report on Lye Peeling

LYE PEELING. By C. F. Wolters, Jr., G. H. Elledge and R. D. Kerwin. Published by Diamond Alkali Co., 436 7th Ave., Pittsburgh, Pa., 1943. 34 pages; 6x9 in.; paper. Free.

Based upon information obtained through research and from field service activities, together with facts from other sources such as the U. S. Department of Agriculture and state agricultural experiment stations, this pamphlet is a practical discussion of lye peeling in all its aspects. As such, it will be of interest to dehydrators and perhaps other processors of root vegetables.

The pamphlet pertains principally to the lye peeling of potatoes on a commercial plant scale, with such information as may be necessary to modify the process for carrots, beets, rutabagas and turnips. The authors discuss the steps in the lye peeling process, the types, sizes and capacity of lye peelers, the strength and temperature of the lye solution, lye bath control, washers, weight losses and trimming, and blanching and discoloration.

In regard to high temperature-high concentration operation, the authors state that the range between 20 and 30 percent caustic concentration at slightly below the boiling point gives most of the advantages to be had at the higher ranges, while the increased safety and life of equipment should compensate for any loss in efficiency or capacity.

Food in the War and After

THE ANNALS. NUTRITION AND FOOD SUPPLY: THE WAR AND AFTER. Edited by John D. Black. Published by The American Academy of Political and Social Science, 3457 Walnut St., Philadelphia, Pa., 1943. 268 pages; 6¼x9¼ in.; paper. Price, $2.

Almost all phases of the war and postwar problems of feeding the world are discussed in the 52 separate articles written for this volume by authorities on their respective subjects. About one-third of the work is devoted to the currently important subject of nutrition, the remainder being devoted to food supplies and public policy, consumption and distribution and production and processing.

This is the type of information that is molding the thinking of the public, and more particularly of government officials and legislators, with respect to what are the important food problems and what ought to be done to solve them. As such, it ought to be read by those directing the operations of food companies. Here are a couple of sentences from one article that indicate why: "The fact that we are passing through a political, economic and cultural crisis means that customs and social controls are in flux. Those who plan or direct what may be called a food policy have a surprisingly free hand in utilizing the readiness of our people for change."

Refrigeration Handbook

THE REFRIGERATING DATA BOOK. Published by the American Society of Refrigerating Engineers, 50 West 40th St., New York, N. Y. 1943. 670 pages; 6½x9½ in.; cloth. Price, $4.

Now in its fifth edition, this refrigerating data book is probably the most complete and authentic source of information available on refrigeration and air conditioning. This last edition does not include refrigeration applications, but it covers in a very thorough manner the basic principles and data, the refrigeration cycle and the major kinds of refrigerating and air conditioning machinery. The subject matter is divided into these five parts: Refrigerating cycles, fundamental data, industrial systems, domestic-commercial systems and air conditioning systems.

This data book is written in the language of the engineer, but the information is concisely and clearly presented. Many drawings are used to illustrate principles and apparatus, and a wealth of data is contained in numerous tables.

At the end of the book is a catalog of refrigerating equipment and supplies, as well as a directory of distributors.

Barleys Evaluated

INDUSTRIAL EVALUATION OF TWO BARLEY VARIETIES GROWN IN 1941. Published by Malt Research Institute, Madison, Wis., 1943. 59 pages; 7x10 in.; paper. Free.

In this pamphlet, its third publication, the Malt Research Institute summarizes the results of the third year's investigations of Oderbrucker and Wisconsin Barbless barleys. Conclusions regarding the final comparative evaluation of the two varieties are not attempted, nor are the results for the three years compared or interpreted. However, the data includes many significant facts.

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PATENTS

Eggs Mechanically Opened and Meats Separated From Shell—Laurence M. Sigler, St. Louis, Mo., one-third to Kathryn B. Gill and one-third to James C. Gill, San Francisco, Calif. No. 2,314,741. March 23, 1943.

Dextro-Tartaric Acid Prepared by Fermentation—Jonas Kamlet, Brooklyn, N. Y., to Miles Laboratories, Inc., Elkhart, Ind. No. 2,314,831. March 23, 1943.

Food Juices Preserved Against Deterioration by Rapid Indirect Heating at Atmospheric Pressure to Temperature Slightly Less Than Boiling Point in Atmosphere Supersaturated With Water Vapor at Temperature Approximating That of Food Juice—Avedis Artinian, New York, and Cloyd M. Chapman, Glen Cove, N. Y. No. 2,314,837. March 23, 1943.

Coffee Bean Oil Processed to Produce Resinous and Volatile By-products—Herbert S. Polin, New York, Albert I. Nerken, Brooklyn, and Henry Wettingfeld, Jr., Bayside, Long Island, N. Y., to Coffee X Corp. No. 2,314,893. March 30, 1943.

Filled Milk Bottles Capped With Heat-sealing Hoods—Gerhard H. J. Baule, Syracuse, N. Y., to Oswego Falls Corp., Fulton, N. Y. No. 2,314,918. March 30, 1943.

Unsaponifiable Portion of Coffee Oil Treated With Fatty Substance to Inhibit Deleterious Change — William Redmond Johnston, Bronx, and Herbert C. Gore and Charles N. Frey, Scarsdale, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,314,988. March 30, 1943.

Green Coffee Beans Treated for Recovery of Caffeine and Separation of Oil for Making of Plastic—Herbert S. Polin, New York, N. Y. No. 2,315,005. March 30, 1943.

Container Consisting of Plurality of Windings of Adhesively Coated Fiber Strip Made and Sealed So as to Withstand High Internal Pressure—Harold E. Rue, Wauwatosa, Wis., to Pabst Brewing Co., Chicago, Ill. No. 2,315,014. March 30, 1943.

Fruit Juices Extracted by Machine Operating in Horizontal Plane and Consisting of Cylindrical Casing and Rotating Drum Carrying Toothed Cutting Blades—Matthew J. Thomas, Los Angeles, Calif. No. 2,315,028. March 30, 1943.

Fruits and Vegetables Graded According to Weight by Means of Rotatable Table—Adolfo Wenz, Malloco, Chile. No. 2,315,100. March 30, 1943.

Bread Dough Mixer Equipped With Means for Cooling Both Ingredient and Mixer-cooling Water—Merlin A. Sticelber, Kansas City, Mo. No. 2,315,230. March 30, 1943.

Fruit Dryed While Moving Through Compartment on Series of Endless Belts Operating Over Individual Pairs of Rolls of Varying Diameter to Form Troughs Between Successive Belts—Thomas G. Cunning, Upland, Calif. No. 2,315,246. March 30, 1943.

Meats and Other Foods Subjected to Refrigerated and Humidified Conditions to Accomplish Tenderizing During Storage Period — Arthur R. Dennington, East Orange, N. J., to Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. No. 2,315,285. March 30, 1943.

Perishables in Cargo Compartments Preserved Against Deterioration by Circulation of Refrigerated Air—Hector Harris Robson, Scarsdale, N. Y., to United Fruit Co., Boston, Mass. No. 2,315,379. March 30, 1943.

Molasses Treated to Prevent Adhering to Surfaces of Equipment and Pipes Resulting in Clogging and Local Overheating During Fermentation—Frank M. Hildebrandt, Baltimore, Md., to U. S. Industrial Alcohol Co., New York, N. Y. No. 2,315,422. March 30, 1943.

Molasses Fermented to Produce Glycerin—Frank M. Hildebrandt, Baltimore, Md., to U. S. Industrial Alcohol Co., New York, N. Y. No. 2,315,423. March 30, 1943.

Food Packaged in Self-heating Container—Leo Katz, Hollywood, Calif., to Hotcan Corp., Los Angeles, Calif. No. 2,315,528. April 6, 1943.

Light-colored Molasses Treated to Inhibit Darkening During Storage Period—Charles J. Krister, Cleveland, Ohio, to E. I. du Pont de Nemours & Co., Wilmington, Del. No. 2,315,626. April 6, 1943.

Bread Sliced by Mechanically Operated Knife—Arthur H. Ahrndt, to U. S. Slicing Machine Co., La Porte, Ind. No. 2,315,761. April 6, 1943.

Bread Sliced by Plurality of Mechanically Operated Knives — Morris Brustowsky, Brooklyn, N. Y., to U. S. Slicing Machine Co., La Porte, Ind. No. 2,315,767. April 6, 1943.

Natural Aromatic Fruit Flavoring and Coloring Stabilized Against Oxidative Deterioration by Addition of Hydroquinone, Toluhydroquinone, Catechol and Resorcylaldehyde—William Redmond Johnston, Bronx, William E. Stokes, Brooklyn, Margaret H. Kennedy, New York, and Charles N. Frey, Scarsdale, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,315,858. April 6, 1943.

Liquid Foods Packaged in Container Sterilized by Injection of Steam and Freed From Condensate by Vacuum Immediately Preceding Filling—Douglas M. McBean, Rochester, N. Y., to Beech-Nut Packing Co., Canajoharie, N. Y. Nos. 2,315,865 and 2,315,866. April 6, 1943.

Hard or Frozen Berries Freed From Stems and Foreign Particles as Well as Surface Dirt by Continuous Mechanical Means—Cole Bridges, Calais, Me. No. 2,315,929. April 6, 1943.

Ground Meat Forced Into Loaf-forming Molds Under Mechanical Pressure—Anthony Giglio, to Fulton Stuffer Corp., Boston, Mass. No. 2,315,952. April 6, 1943.

Fish Oil Saponified and Distilled Under High Vacuum at Varying Temperatures to Separate and Recover Plurality of Antirachitic Substances—Kenneth C. D. Hickman and Edward Le B. Gray, to Distillation Products, Inc., Rochester, N. Y. No. 2,316,068. April 6, 1943.

Fruits and Vegetables Washed and Otherwise Treated During Passage Through Pair of Parallel Tubes Containing Endless Conveyor Operating Under Liquid Seal—Ronald B. McKinnis, to Sunshine Foods, Inc., Winter Haven, Fla. No. 2,316,094. April 6, 1943.

Berries Mechanically Graded and Washed in Continuous Manner—Roy James Evett, Seattle, Wash. No. 2,316,159. April 13, 1943.

Flavoring Sirups Added in Successive Portions to Partially Frozen Mass so as to Give Helter Skelter Distribution—Harry R. Howser, Washington, D. C. No. 2,316,165. April 13, 1943.

Liquids and Semi-liquids Dried on Atmospheric Drum Drier—Charles O. Lavett, to Buffalo Foundry & Machine Co., Buffalo, N. Y. No. 2,316,176. April 13, 1943.

Flour and Similar Flowable Products Freed From Insect Infestation by Mechanical Action of Centrifugal Force—Franklin S. Smith, New Haven, Conn. No. 2,316,193. April 13, 1943.

Casein Curd and Similar Material Rapidly Dried in Stream of Heated Air Having Vortex Movement—William B. Winter, Belmont, Mass., to Atlantic Research Associates, Inc., Newtonville, Mass. No. 2,316,207. April 13, 1943.

Coffee, Cocoa Beans, Peanuts and Like Roasted Under Automatically Controlled Conditions—Maurice D. Woodruff, to Bauer Brothers Co., Springfield, Ohio. No. 2,316,208. April 13, 1943.

Beer Treated With Alkalized Silica Gel During Processing—Eberhard Heimann, Berlin-Schoneberg, Germany, to Alien Property Custodian. No. 2,316,241. April, 13, 1943.

Cream-filled Wafers Made by Mechanical Means—Sol S. Leaf, to Overland Candy

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If you calculate the hardness imparted to 40° brine by salt, you will see that 99.75% pure salt adds 267 parts per million of calcium and magnesium hardness. A 99.46% pure salt adds 572 parts per million of hardness. A 99.26% pure salt adds well over 1000 parts per million. If your water softener takes out 100-150 parts per million, your salt may add several times the calcium and magnesium being removed! Pure Diamond Crystal Salt (99.96% pure) will add only 41 parts per million of calcium and magnesium hardness to 40° brine.

Don't forget that calcium and magnesium introduced into your food products must be added to what is in your water supply. For, in processing food products that contain pectin or protein, calcium and magnesium alter their physical properties, developing toughness. And, as you know, the public judges food products by their tenderness.

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If *you* have a salt problem, write our Director of Technical Service, Diamond Crystal, Dept. J-6, St. Clair, Michigan.

DIAMOND CRYSTAL
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Corp., Chicago, Ill. No. 2,316,259. April 13, 1943.

Vegetables Mechanically Peeled During Passage Through Longitudinal Unit—Neal S. Sells, Hoopeston, Ill., to Food Machinery Corp., San Jose, Calif. No. 2,316,368. April 13, 1943.

Soybeans Soaked in Solution of Sodium Chloride Containing Flavoring and Coloring Agent and Heat Treated in Oil to Obtain Moisture Content of 2 to 8 Per cent—Oreste Scalise, New York, N. Y. No. 2,316,458. April 13, 1943.

Edible Fats Treated With Ruptured Yeast Cells for Removal of Undesirable Odor or Flavor—Hertert Otto Renner, Des Plaines, Ill., to J. R. Short Milling Co., Chicago, Ill. No. 2,316,621. April 13, 1943.

Cornstarch Separated From Corn Gluten by Centrifuging—Albert Peltzer, San Francisco, Calif. No. 2,316,807. April 20, 1943.

Cultured Buttermilk Made Under Controlled Conditions—Harold S. Fielder, La Grange, Ill., and Latour O. Ott, Los Angeles, Calif., to Cherry-Burrell Corp., Wilmington, Del. No. 2,317,045. April 20, 1943.

Bun Dough Mechanically Shaped in Pans—Dorsey Edwin Walter, Sedalia, Mo. No. 2,317,316. April 20, 1943.

Candy Packed in Flexible Sided Cups by Mechanical Means—Herbert F. Goodwin, Melrose, Mass, one-half to Edgar P. Lewis & Sons, Inc., Malden, Mass. No. 2,317,374. April 27, 1943.

Added to Frozen Foodstuffs Flavoring Materials at Predetermined Intervals and at Temperature That Permits Permeation of Unfrozen Flavoring Film Through Frozen Mass—Harry A. Noyes, Newton, Mass. No. 2,317,397. April 27, 1943.

Food-filled Cans Freed From Air and Gases in Head Space by Jet of Steam Just Prior to Sealing—Frederick C. Marx, Cincinnati, Ohio, to Heekin Can Co., Norwood, Ohio. No. 2,317,470. April 27, 1943.

Concentrated Corn Sirup Converted to Dry Solid Form by Spray Drying—David D. Peebles, Berkeley, and Paul D. V. Manning, Berkeley Woods, Calif., to Golden State Co., Ltd., San Francisco, Calif. No. 2,317,479. April 27, 1943.

Liquids Pasteurized by Steam Vapor Under Thermostatically Controlled Conditions—Norman J. Peters, to Damrow Brothers Co., Fond du Lac, Wis. No. 2,317,480. April 27, 1943.

Flaked Cereals Dried and Toasted During Passage of Heated Air Through Rotating Drum—Thomas R. James, Minneapolis, Minn., to General Mills, Inc. No. 2,317,532. April 27, 1943.

Doughnuts and the Like Deep-fat Fried in Kettle Fitted With False Bottom Designed to Trap Fragments of Material Being Cooked; Keeping Them Out of Contact With Oil Heating Surface—Philip K. Winter, Oakland, Calif. No. 2,317,704. April 27, 1943.

Starch Modified by Treating Water Suspension With Chlorine Oxidizing Agent in Presence of Nitrogenous Buffer—Arthur D. Fuller, to National Starch Products, Inc., New York, N. Y. No. 2,317,752. April 27, 1943.

Sausages Packaged in Artificial Casings Comprised of Paper Impregnated With Sulphonated Organic Agent and Subsequently Treated With Aqueous Solution of Proteids Containing Small Quantity of Rubber Latex and Vulcanizing-accelerating Agent—Owschia Lazar Janser, to Mark Brainos, London, England. No. 2,317,779. April 27, 1943.

Excess Biological Film Removed From Sewage Disposal Filter by Back Washing and Continuous Applied Current of Air Under Pressure—Max Levine, to Iowa State College Research Foundation, Ames, Iowa. No. 2,317,782. April 27, 1943.

Cheese Treated With 1 to 5 Percent Calcium Lactate During Agitation and Heating From 130 to 180 Deg. F. to Produce Emulsion With Smooth Body and Texture—James D. Ingle, to Industrial Patents Corp., Chicago, Ill. No. 2,317,958. April 27, 1943.

Foods Dehydrated Without Case Hardening by Three-stage Procedure—George A. Sykes and Agnes Louise Andrea, Sodus, N. Y. No. 2,318,027. May 4, 1943.

Natural Occurring Proteins Suspended in Ethylene Diamine and Water Solution Heated Under Pressure From 100 to 200 Deg. C. to Produce Amino Acid Amide—Frederick C. Bersworth, Verona, N. J., to Martin Dennis Co., Newark, N. J. No. 2,318,046. May 4, 1943.

Fruit Juices Subjected to Deaeration Without Turbulent Movement of the Juice and With Maintenance of Homogeneity—Frank H. Collins, Orange, Calif., to California Fruit Growers Exchange, Los Angeles, Calif. No. 2,318,141. May 4, 1943.

Vegetable and Fruit Juices Extracted in Continuous Manner Without Oxidation—Ronald B. McKinnis, to McKinnis Foods, Winter Haven, Fla. No. 2,318,178. May 4, 1943.

Whole Nuts Shelled Without Breaking of Meats by Injection of Water Between Shells and Kernels and Converting Water Into Steam by External Heat—Arthur F. Stagmeier, Upper Montclair, N. J., to General Foods Corp., New York, N. Y. No. 2,318,265. May 4, 1943.

Green Vegetables Prepared for Canning by Treating With Solution Containing Alkaline Reagent With Magnesium Cation and Then With Solution Containing Alkaline Reagent With Calcium Cation—Walter L. Schroder, Hortonville, and Thomas A. Rogers, Stevens Point, Wis. No. 2,318,426. May 4, 1943.

Canadian Patents

Potatoes Washed and Dried in Heated Air to Prevent Soft Rot During Shipment—Alexander F. Arthur, Homestead, Fla., to F. C. Peters, Inc., Goulds, Fla. Nos. 410,905 and 410,906. March 2, 1943.

Grains and Seeds Graded on Weight Basis in Centrifugal Classifier of Liquid Charged Type—Edgar D. Eddy, to Eddy Seed Cleaners, Ltd., Ontario, Canada. No. 410,996. March 9, 1943.

Ice Cream Made to Have Variegated Composition—Leo D. Overland, Brooklyn, N. Y., to Joe Lowe Corp., New York, N. Y. No. 411,012. March 9, 1943.

Fruit Partially Cooked and Wilted by Steam Heating in Retort, Subjected to Vacuum for Removal of Air and Gases, Packed in Container While in Shrunken State, Covered With Sirup, Sealed and Processed for Return to Substantially Normal Condition — William Perlman, Syracuse, N. Y., to Continental Can Co., Inc., New York, N. Y. No. 411,261. March 23, 1943.

Wheat Milled to Give Natural High Vitamin Flour—John S. Andrews and Reginald C. Sherwood, to General Mills, Inc., Minneapolis, Minn. No. 411,281. March 23, 1943.

Cheese Treated With From 1 to 5 Percent Calcium Lactate With Agitation and Heating to From 130 to 180 Deg. F. to Form Soft Cheese Emulsion With Smooth Body and Texture—James D. Ingle, to Industrial Patents Corp., Chicago, Ill. No. 411,489. March 30, 1943.

Hams Tenderized During Curing and Sausages While Encased in Natural Casings by Treatment With Culture Products Prepared With Aspergillus Flavus-Oryzae Group Organisms—Lloyd B. Jensen, to Industrial Patents Corp., Chicago, Ill. No. 411,791. April 13, 1943.

Shell Eggs Immersed in Water Solution Containing Hydrochloric Acid, Sodium Dichromate and Wetting Agent to Whiten Shells—James D. Ingle, to Industrial Patents Corp., Chicago, Ill. No. 411,792. April 13, 1943.

Glucose Made From Potatoes—Howard George Wascher, Inglewood, N. J., to Canada Starch Co., Ltd., Montreal, Quebec. No. 411,891. April 20, 1943.

Cheese Emulsified During Heating and Agitation by Addition of Small Quantity of Diammonium Disodium Pyrophosphate — James D. Ingle, Industrial Patents Corp., Chicago, Ill. No. 411,938. April 20, 1943.

Eggs Graded for Weight by Mechanical Means—John S. Campbell and William Brown, Melbourne, Ontario, and George A. Douglas, Mount Brydges, Ontario. No. 411,988. April 27, 1943.

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Questions & Answers

Vitamin Enrichment

New York—"Among other items, we pack a 2-lb. jar of chocolate sirup, the contents of which are milk, cocoa, vanilla, malt, all of which contain some vitamins. We desire, however, to mention on the label this fact but we are of the belief that the vitamins contained are too insignificant to get special mention. We would therefore appreciate advice from you as to how we may include vitamins in this sirup in sufficient quantities to warrant our featuring this on the label."

There does not seem to be any value below which the vitamin content cannot be stated on the label, but it would have to compare well with other fortified products before it was worthwhile to call attention to this property of vitamin content.

For advice as to the method of incorporating the added vitamins, we suggest that you write to various firms which advertise that they supply vitamin products for this purpose.

When you state on the label that a product has definite vitamin values, it becomes a product of "special dietary use," even though it is sold primarily for its food value in a normal diet, according to the Federal Security Agency Regulations of November 18, 1941, for enforcement of the Federal Food, Drug and Cosmetic Act. Since the New York State law contains a similar provision, which will apply in your case whether the product is sold in interstate commerce or not, it is essential that you make sure that the actual vitamin content is high enough to provide a reasonable factor of safety above the amount stated to be present, and it is, of course, necessary to make sure that the label claims are given in the form provided by the Federal Act.

Moisture Determination

In further reply to the question published in the April issue, we have received the following memorandum from C. M. O'Malley, chief chemist of American Dry Milk Institute, Inc.

"The toluol distillation procedure (sometimes called the American Dry Milk Institute method) is the method proposed by Bidwell and Sterling,[1] from an earlier similar procedure reported by Dean and Stark.[2] This procedure was investigated by Wright[3] and a comparison reported between the toluol distillation and vacuum-oven (27 in. mercury at 100 deg. C. for 2½ hours) methods. This report cites some of the reasons for continued loss of weight on drying skim milk in the vacuum oven. Wright concludes that the Bidwell-Sterling toluene-distillation method furnishes the more reliable results. He recommends, however, a two-hour distillation time.

"Thompson and others[4,5,6] have further investigated the procedure and its application to dry milk products. Thompson and Fleming compared the distillation and A.O.A.C. vacuum-oven methods and furthermore checked the variation in results by both methods between two laboratories, finding that variations are about equal by the two methods. They concluded that the toluol distillation method had four distinct advantages: It enables the use of a large-size sample, each determination can be completed in about one hour, it is readily adapted for plant control work, and it is just as accurate as the vacuum-oven method.

"Sharp, Doob and Hart,[7] investigating the effect of the physical state of lactose on the procedure, summarize their work in part as follows: 'The toluene distillation method possesses distinct advantages for the determination of the moisture in dried milk, dried whey and dried casein. The moisture loss-time relationship can be determined without interrupting the process or interfering with the determination. The moisture loss-time relationship indicates the completeness of removal of moisture, and often indicates whether more than one mechanism is involved in the loss of moisture'."

References

1. G. L. Bidwell and W. F. Sterling, Preliminary Notes on the Direct Determination of Moisture, *Industrial and Engineering Chemistry*, vol. 17, 147, 1925.
2. E. W. Dean and D. C. Stark, A Convenient Method for the Determination of Water in Petroleums and Other Organic Emulsions, *Industrial and Engineering Chemistry*, vol. 12, 486, 1920.
3. P. A. Wright, The Determination of Moisture in Dry Skim Milk by the Bidwell-Sterling Toluene Distillation Method, *Journal of Dairy Science*, vol. 11, 240, 1928.
4. E. C. Thompson, W. S. Slemmons and R. S. Fleming, Grades and Methods of Analysis of Dry Skimmilk, *Journal of Dairy Science*, vol. 13, 319, 1930.
5. E. C. Thompson, A. H. Johnson and M. Kloser, Standards and Methods of Analysis of Dried Skimmilk, *Journal of Dairy Science*, vol. 17, 419, 1934.
6. E. C. Thompson and R. S. Fleming, The Determination of Moisture in Powdered Milk by the Toluol Distillation Method, *Journal of Dairy Science*, vol 19, 553, 1936.
7. P. F. Sharp, H. Doob, Jr., and R. G. Hart, Physical State of Lactose as Influencing the Determination of Moisture in Dry Milk Products by the Toluene Distillation Method, *Journal of Dairy Science*, vol. 21, 451, 1938.

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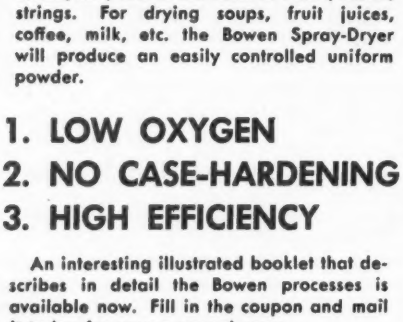

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Letters to the Editor

Dried-Banana Loaves Would Help Feed World

To the Editor
of FOOD INDUSTRIES:

In view of scarcity, rationing and the high point value of dried fruits, I would like to call your attention to a dried-fruit food which is practically unknown to the general public in the United States, which, however, could be a staple product as common as California raisins or prunes; namely, dried-banana loaves.

The bananas are ripened, properly pre-treated and pressed into 100-lb. blocks at the plantation, then shipped in bulk to the distribution centers, where the blocks are graded and reprocessed for storage and consumption.

Cut to 1- to 2-lb. brick sizes, dried-banana loaves look like the mixed-dried-fruit cakes sold around Christmas time. However, they have the uniform compactness of American cheese, a delicious flavor and excellent nutritive properties.

As a source of carbohydrates, minerals, protein and vitamins, the fully-ripened banana, even in its fresh condition with 75 percent of moisture, is superior to any fruit grown in the temperate zones of America or Europe. Accordingly, dried-banana loaves, with their concentration of nutritional essentials, offer an abundance of good energy, at a bargain price.

Because of the high content of natural fruit sugars, their keeping qualities are just as good as those of any other dried fruits.

Most important today: The loading space required for shipping dried pressed bananas in bulk is reduced to about 10 percent of that necessary for shipping the same quantity of fruit as bunches of green bananas.

Dried-banana loaves have been prepared in German colonies and repacked for retail in Hamburg since about 1900. My father, an Austrian merchant and manufacturer, was financially and commercially engaged in this business 30 to 40 years ago. Unfortunately, the enterprise had to be discontinued in consequence of the outcome of the first world war.

Now we are fighting another war, a war which is menacing our sea lanes and forcing us to make every cubic foot of loading space count. As far as food is concerned, extracts and concentrates are becoming increasingly important.

Therefore, considering that for years to come the demands for concentrated yet low-priced food will be enormous and world wide, and considering that untold masses of fresh bananas which cannot be shipped as usual are going to waste, I propose to make the dried banana the basis of a well-preserved staple food of outstanding nutritive value. I propose to organize the production of dried-banana loaves for mass consumption.

On account of certain obstacles, as for instance lack of trained personnel, danger of contamination, invasion by insects, etc., orthodox banana experts may scoff at the idea of having this delicate fruit peeled and handled under tropical working conditions. But the fact is that it was done quite satisfactorily, in Africa, 40 years ago. With all the technical improvements made since then, there is no reason why the same good results should not be obtained in the Americas now.

That my fellow citizens in the United States, the armed forces of the United Nations, the starving people of a war-torn world—especially hungry children—and all the hard-hit economies depending on the banana trade may have the advantages, it is a privilege to offer my professional services for

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the development of this branch of the dried fruit industry, in the Western Hemisphere.—Dr. Emil J. Rausch, *Chemist and Pharmacologist, Arizona State Department of Health, Laboratory Division, University of Arizona, Tucson.*

Honey Packer Asks For Help On Production Problems

To the Editor
of Food Industries:

Your February issue contains a most interesting illustrated article, "Dehydration of Vegetables . . . Carrots."

The dehydration of food is, of course, nothing entirely new, but recently it has come into the foreground because of the large demand, and therefore it has come to be a very valuable and important item in our food industry. And that brings us to bees' honey.

Honey has been produced and consumed by mankind for over 5,000 years, at least that is a well-founded discovery. During the last 35 years the commercial production of honey in our country has trebled and quadrupled, and today the average crop of honey made in the United States amounts to over 200 million pounds. Yet there does not exist any standard equipment for melting, blending and packing honey into subcontainers. Whereas the type of supplies for production has been standardized by pioneer bee supply manufacturers, the first-mentioned method of bringing the ready production through packing channels to the ultimate consumer is mostly of makeshift nature. The reason is perhaps that there are very few large and individual honey packers, as a very great amount of our crops are being purchased by people who pack preserves and use the same equipment for honey, or wholesale grocers who make their own.

Today our government has asked the producers to increase production to 275 million pounds, since honey is being needed vitally for feeding the nation and the byproduct, beeswax, is needed in unlimited quantities by the war industry.

The reason for writing you this letter is to suggest that, if possible, your good publication should try to influence the different honey packers in the United States to pool their experience on packing honey and then have one or two, or a few more, machinery companies concentrate on the manufacture of some standard equipment that could be bought just like a bakery buys needed equipment for its purpose.

At least it is a thought that I have been having for considerable time.—H. H. Schumacher, *B-Z-B Honey Co., 361 East Valley Blvd., Alhambra, Calif.*

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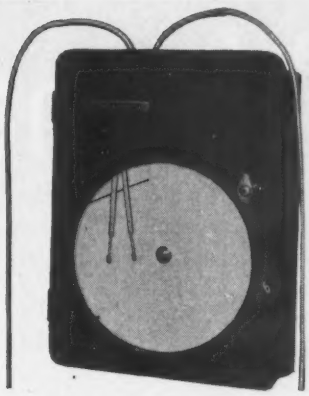

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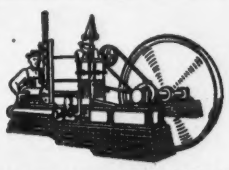

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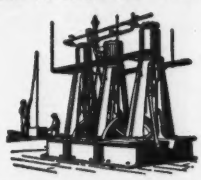

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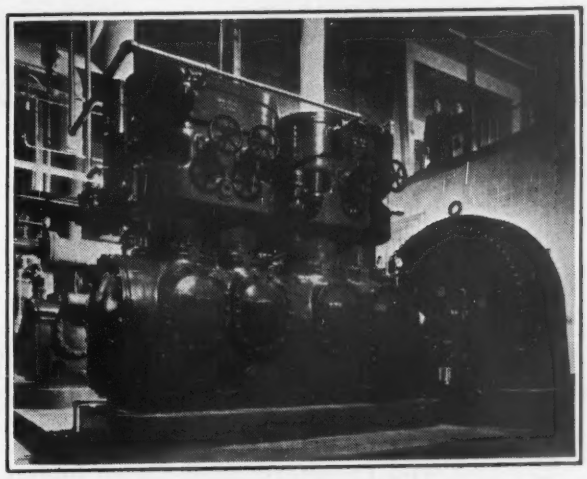

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FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

BAKING

Breaking Strength Of Pastry Wafers

BECAUSE there is no accepted standard test for the breaking strength of pastry wafers, the author conducted experiments with lard wafers to establish the influence of some of the variables involved.

Breaking strength was increased by conditions which permit more complete hydration and development of the gluten; for example, increase in water content and increase in mixing time after adding water when the ingredients are at ice box temperature. With ingredients at room temperature the breaking strength is the same or lower with increased mixing time after adding the water, probably because of the protection of the flour by the more plastic fat at this temperature.

Details of the test method are given.

Digest from "Effect of Certain Variables in Technique on the Breaking Strength of Lard Pastry Wafers," by VeNona Swartz, *Cereal Chemistry*, vol. 20, 121–26, January, 1943.

DAIRY PRODUCTS

Mold Mycelia Tests On Cream for Butter

SINCE the mold mycelia test, used by the Federal Food and Drug Administration to determine quality of cream from which butter has been made, is relatively new to the dairy industry, there is need for information regarding this test. The standard test is applied only to butter, and is a modification of that used on tomato products. There is no corresponding test which can be used directly on the cream and which will give results in terms of percent positive fields of mold. It is therefore necessary to churn cream samples into butter, and apply the mold test on the product. For this purpose a method has been developed which will give results representative of those obtained in commercial practice.

It has been found that 20-ml. samples of cream can be mixed with ice water and churned with a Hamilton Beach No. 18 malt mixer. Working details of the method are given. A statistical analysis of results from small samples compared with commercial butter from the same cream showed that the small samples give mold counts in satisfactory agreement with those of the commercial product.

The malt mixer method is suitable for investigating factors related to mold in cream samples obtained from the farm, cream station, factory or laboratory.

Digest from "A Rapid Method of Churning Cream into Butter for Mold Mycelia Determinations," by H. H. Wilkowske and K. M. Renner, *Journal of Dairy Science*, vol. 26, 283-87, March, 1943.

DEHYDRATION

Moisture Equilibrium in Dehydrated Vegetables

THE Western Regional Laboratory has reported results of measurements on moisture loss or gain by five dehydrated vegetables, Savoy cabbage, Puerto Rico yams, prickly winter spinach, Russet white potatoes, Chantenay and Imperator carrots. The work is being continued.

Samples were held at constant humidity and constant temperature until no further change in weight occurred, and then the moisture was determined as the difference between the weight at equilibrium and the weight after complete removal of all moisture from the sample. Equilibrium was approached from both sides, by the use of fresh vegetable samples as well as those dried below the equilibrium point by heating in a vacuum at 158 deg. F. for 3 to 4 hours. The values found gave satisfactory agreement.

The results are reported as percent moisture content on completely dry weight, plotted against percent relative humidity, at constant temperature. Curves are given for each vegetable at two temperatures. At lower humidities there is little difference in the values for the various vegetables, but at higher humidities the differences become important. At the same relative humidity the moisture content decreases with increasing temperature. (See accompanying table.)

The vegetables were tested without blanching, except in the case of some potato samples. When potatoes were treated with live steam for 30 minutes, then mashed and dehydrated, the samples which were dried slowly after mashing gave a distinctly lower value for equilibrium moisture than those which were subjected to rapid vacuum dehydration. The difference is attributed to the condition of the starch grains. The slowly dried samples continued to show low values, even after rehydration.

Curves determined in this way provide information for the design of dehydrating processes and for packaging. The curves show the inflection point which is believed to represent a change from ordinary surface adsorption at low relative humidity to a multilayer adsorption or "capillary condensation" at higher relative humidities. For the vegetables studied the inflection point at 158 deg. F. corresponds to from 4 to 6 percent moisture content. The agreement of this point with the upper value of permissible moisture empirically determined may mean that deterioration of vegetables is not sufficiently reduced until the moisture content is below the region of capillary condensation. This may prove to be important in determining the permissible water content for other dehydrated vegetables.

Digest from "Equilibrium Moisture Content of Dehydrated Vegetables," by B. Makower and G. L. Dehority, *Industrial and Engineering Chemistry*, vol. 35, 193-97, February, 1943.

Equilibrium Moisture Content in Percent on Dry Weight for Unblanched Vegetables, at Temperatures Indicated.

Relative humidity %	Cabbage		Yams		Spinach		Carrots		Potatoes
	97.7°F	158°F	97.7°F	158°F	97.7°F	158°F	97.7°F	158°F	97.7°F
10.....	2.3	1.4	3.2	2.1	3.4	0.9	1.8	1.8	4.2
20.....	3.8	2.5	4.6	3.4	4.6	1.6	3.1	3.1	6.0
30.....	5.2	3.6	5.8	4.3	5.6	2.1	4.9	4.9	7.4
40.....	7.3	5.0	7.2	5.2	7.3	2.8	8.0	7.4	8.9
50.....	10.3	6.9	9.2	6.6	9.5	3.8	11.9	10.4	10.9
60.....	15.1	...	11.6	...	12.4	...	17.1	14.0	13.2
70.....	22.2	...	15.3	...	17.9	...	24.2	....	16.1

VITAMINS

Carotene Determination

CAROTENE in vegetable oil solutions can be determined quickly, without the use of saponification methods, by sepa-

rating it from other colored substances through the use of aluminum oxide activated especially for chromatographic analysis. Two percent acetone in petroleum ether will remove the carotene quantitatively from the adsorption column. This gives a separation from the colored oxidation products of carotene, xanthophylls and chlorophylls, which will give inaccurate results when carotene is determined by total color after a simple dilution. The colored oxidation products may develop during storage of carotene solutions in oil.

Digest from "Determination of Carotene in Vegetable Oils without Saponification," by E. Bickoff and K. T. Williams, *Industrial and Engineering Chemistry, Analytical Edition*, vol. 15, 266-68, April 15, 1943.

CEREAL PRODUCTS

High-Moisture Wheat Treated with Ethylene

WHEN moist wheat is treated with traces of ethylene, its keeping quality is improved, as compared with untreated wheat, and flour from treated grain has improved baking properties similar to those of aged flour.

In storage tests approximating commercial conditions, 350 bu. in each bin, somewhat immature wheat with an initial moisture content of 17.2 percent responded very favorably to ethylene treatment, at a concentration of approximately one part ethylene to 10,000 parts of air. The rate of carbon dioxide evolution was increased during the early part of the storage period, and the amount of heating was reduced. The grade of grain, percentage germination and baking performance were improved by treatment.

Ethylene will not prevent spoilage over long periods when high-moisture wheat is stored, but it does materially retard deteriorative effects.

Digest from "Studies on Treating Wheat with Ethylene. I. Effect Upon High Moisture Wheat," by W. S. Hale, S. Schwimmer and E. G. Bayfield, *Cereal Chemistry*, vol. 20, 224-33, March, 1943.

Wheat Germ Protein

WHEAT germ protein is as effective as casein in supplementing a low-protein diet. Feeding tests on rats, at approximately 10 percent protein in the basal diet, gave a biological value of 2.87 to 2.41, compared to 2.30 for commercial casein, 2.85 for dry skim milk and 2.58 for boiled dry egg white. At higher protein levels the wheat germ protein was equal to casein, skim milk powder or dry beef muscle in promoting growth.

Heat processing of wheat germ, for better keeping quality and flavor, does not affect the biological value of the protein. It is suggested that wheat germ can be utilized in the human dietary and in nonruminant animal feeds as a supplemental protein.

Digest from "The Nutritive Value of Wheat Germ Protein," E. L. Hove and C. G. Harrel, *Cereal Chemistry*, vol. 20, 141-48, March, 1943.

MISCELLANEOUS

Saccharide Fermentation

ACCELERATION of the initial fermentation rate for maltose and galactose with yeast can be obtained by causing the fermentation to take place in the presence of an atmosphere containing more oxygen than the air, and preferably in an atmosphere of pure oxygen. Oxygen may also be bubbled through the solution to provide additional contact.

The fermentation medium should also contain a yeast-assimilable nitrogen compound such as an ammonium salt. It may contain other materials, such as thiamin and niacin.

Fermentation will take place over the range of pH 2.6 to 6.4, but best results occur with a value of about 5.36. Buffer salts may be used to adjust the pH.

Digest from U. S. Patent 2,311,418, issued February 16, 1943, to A. S. Schultz, L. Atkin, and C. N. Frey, and assigned to Standard Brands, New York, N. Y.

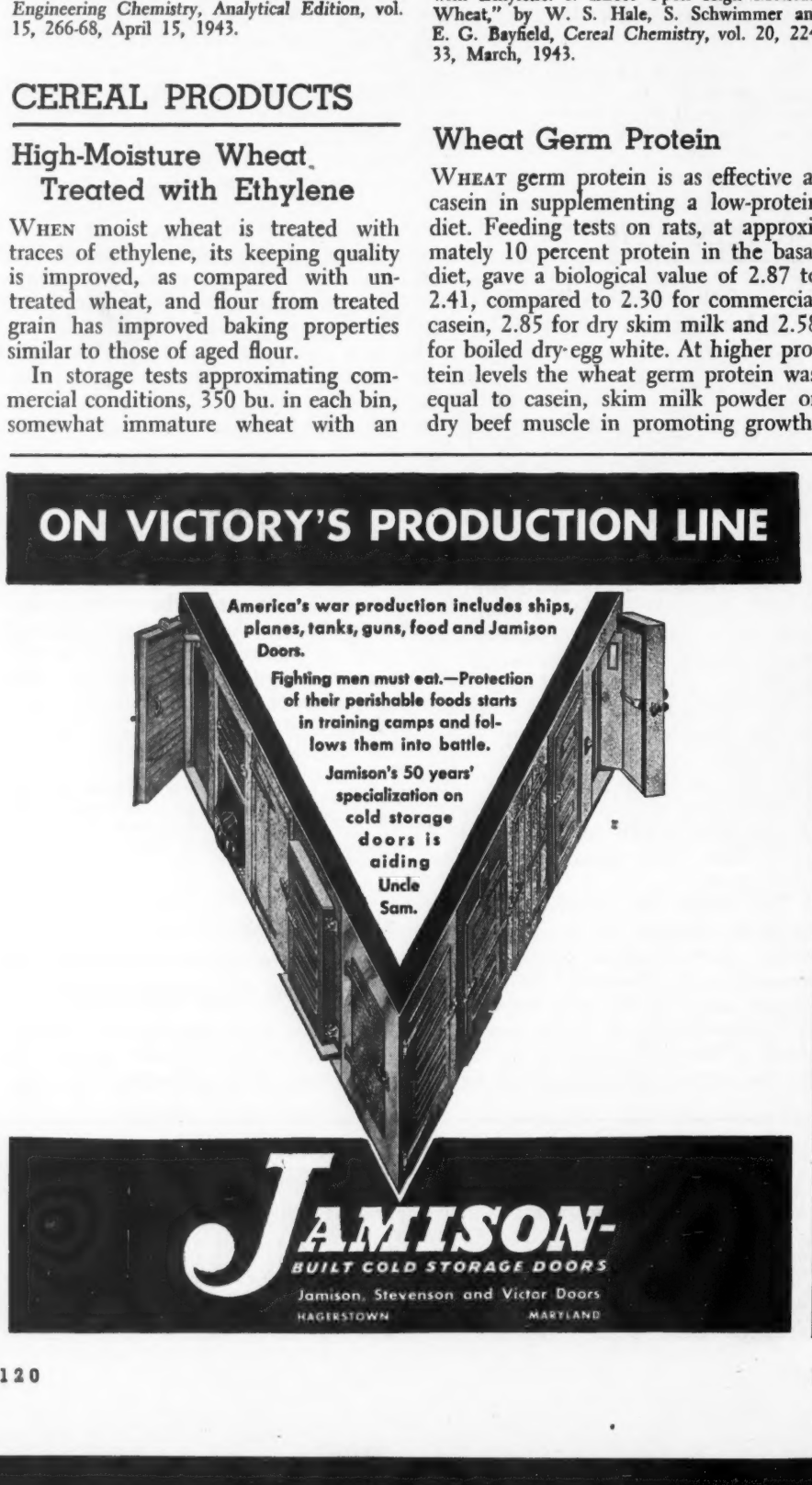
Color Specification

SCIENTIFIC methods for accurately specifying color have existed for 20 years or more, but the system has not been useful except to experts in the particular field. Now the American Standards Association has adopted a war standard to give to all groups interested in color a common basis for its description in mutually comprehensible terms.

The spectrophotometer is the basic instrument in this standardization and results may be expressed in terms of the curve of reflectance for the specimen compared to magnesium oxide, which is as near to perfect white as can be obtained.

Data may also be expressed in terms of the "standard observer" adopted by the International Commission on Illumination. The standard observer methods provides a mathematical means of expressing color in terms of the proportion of each of three arbitrary primary colors which may be present in the sample. The method involves considerable calculation, which, however, is simplified by the existence of charts and tables of values.

Finally, the new standard provides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for correlation of spectrophotometric data with the material standards of the Munsell Book of Color, 1929 edition, where this can be applied. The Munsell book provides a direct visual comparison, except for transparent media, illuminants and some surfaces whose colors fall outside the range of Munsell samples.

Digest from "Common Language of New Standard Simplifies Color Specification," *Product Engineering*, vol. 14, 91-94, February, 1943.

SANITATION

Sterilization of Dairy Utensils

BACTERICIDAL action by two types of ultraviolet lamp, both of which emit radiations mainly in a narrow band in the vicinity of 2,537 Angstrom units, was studied as a means of sterilizing dairy utensils and equipment.

Organisms growing on the surfaces of such equipment as milk bottles, tinned dippers, cans and pasteurizing vats were completely destroyed or greatly reduced in numbers in comparatively short times. Unclean, rough, cracked and shaded surfaces were not readily sterilized by use of ultraviolet radiation.

Organisms, to be destroyed, must be on or near the surface. Films of water up to 10 mm. deep did not decrease the effectiveness, but opaque substances such as milk and agar did. An increase in the concentration of the organisms decreased the bacterial effect, and probably the formation of clumps of organisms would have the same effect.

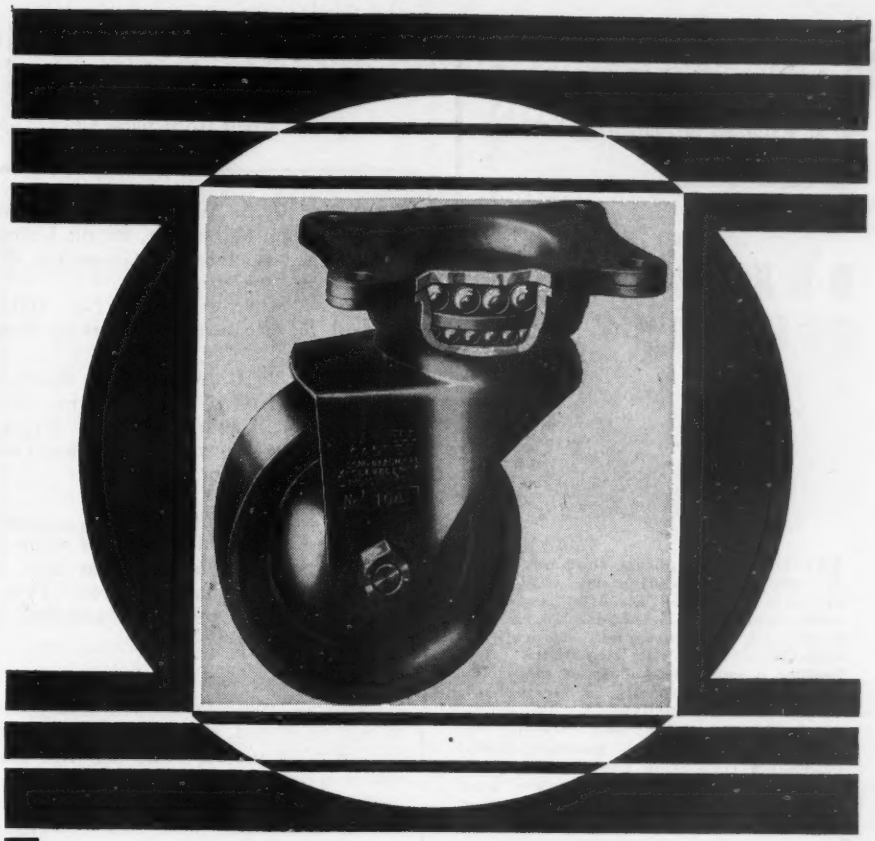
Low temperatures had no appreciable effect on the bactericidal rate, when the lamp was operated at room temperature. When the lamp was operated at low temperatures, a decided decrease in bactericidal rate occurred.

Digest from "Bactericidal Action of Radiant Energy from Special Types of Lamps on Organisms Found in Dairy Utensils and Equipment," by R. B. Arnold and O. F. Garrett, *Journal of Dairy Science*, vol. 26, 309-20, April 1943.

Sanitation in Milking

CHLORINE, above 50 p.p.m., in the water used to wash the cow's udder before milking and to rinse the teat cups between milking successive cows, reduces the bacterial count of the milk and the danger of infection. In these tests, bacterial count in the milk was reduced 34 percent by the recommended practice.

Digest from "The Value of Chlorine in Producing Low Bacterial Count Milk," by J. H. Byers and H. P. Ewalt, *Journal of Dairy Science*, vol. 26, 277-81, March, 1943.



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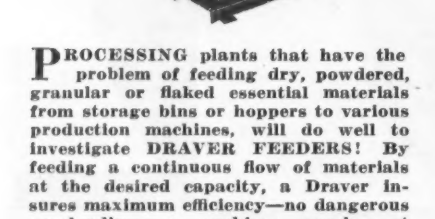

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Army Specifications For Dehydrated Foods

(*Continued from page 52*)

Tentative U. S. Army Specification No. 22-43, Supplies, Subsistence, for the United States Army, Conditions Governing the Purchase of.

U. S. Army Specification No. 100-2, Standard Specifications for Marking Shipments.

Quartermaster Corps Tentative Specification OQMG No. 12-A, Packing for Overseas Shipment, Canned Fruits and Vegetables and Other Items of Subsistence; General Specifications for.

Types and Grade

Types—Dehydrated cranberries shall be such of the following types as may be specified in the invitation for bids: Type I (flakes), Type II (powdered) and shall be of the grade indicated herein.

Material and Workmanship

The cranberries used for dehydration shall be well developed, ripe, bright, clean, hard, dry, of good natural color and free from soft or wet stock. The dehydrated product shall be prepared under sanitary conditions and in accordance with best commercial practice.

General Requirements

All deliveries shall conform, in every respect, to the provisions of the Federal Food, Drug and Cosmetic Act, and regulations promulgated thereunder.

The product and packages shall be free from insect infestation. The manufacturer shall guarantee the quality of the unopened package of dehydrated cranberries for a period of 12 months from date of acceptance. The manufacturer shall guarantee satisfactory rehydration of dehydrated cranberries when immersed in water at a temperature not to exceed 212 deg. F.

Detail Requirements

Dehydrating—The temperature and humidity of the air during dehydration shall be such that the product will not be scorched or otherwise damaged.

Dehydrated Product: Color and Flavor—The dehydrated product, when rehydrated, shall have the natural characteristic color and flavor of the fresh product.

Moisture Content—The moisture content of the finished product shall not exceed 5 percent by weight.

The dehydrated product shall be free from skin, seeds, worm damage, rot, mold, grit, fillers, chemical preservatives, artificial colorings or other foreign materials.

Inspection and Tests

Inspection shall be made at the point of origin, unless otherwise specified. Moisture determination shall be made by the vacuum-oven method by drying 2 grams of the product at 70 deg. C. for 6 hours in partial vacuum having a pressure of not over 100 mm. of mercury.

Packing and Marking

Packaging—Unless otherwise specified, the dehydrated cranberries shall be vacuum packaged in number 2½ hermetically sealed sanitary cans, 1 lb. to the can.

The sanitary cans shall be of the following construction:

1. Body of hot-dipped tinplate (107-lb. plate with 1.25-lb. tin coating per base box) with ends of chemically treated blackplate or electrolytic tinplate (107-lb. plate with not more than 0.5-lb. tin coating per base box), body seam to be soldered, top and bottom seams to be compounded or soldered, outer surfaces of the ends protected against corrosion by the application of a corrosion-resistant coating of lacquer or enamel.

2. Body of electrolytic tinplate (107-lb. plate with not more than 0.5 lb. of tin coating per base box) with ends of chemically treated steel, body seam to be soldered, top and bottom seams to be compounded or soldered, the ends enameled on both sides.

3. Body and ends of electrolytic tinplate (107-lb. plate with not more than 0.5 lb. of tin coating per base box), body seam to be soldered, top and bottom seams to be compounded or soldered, all outer surfaces protected against corrosion by the application of corrosion-resistant coating of lacquer or enamel.

Labeling—Unless otherwise specified, the label on each container shall be marked with the name and type of product, the net weight in pounds, the month and year of dehydration, name and address of packer, location of processing plant, and specific directions for making cranberry sauce, jelly and cocktail, respectively.

Packing: Domestic—Unless otherwise specified, the product shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

Export—Unless otherwise specified, the product shall be packed in nailed wooden or in weatherproof solid fiber boxes complying with Quartermaster Corps Tentative Specification OQMG No. 12-A. All strap iron and wire bands shall be securely fastened and the ends cut off or secured to prevent injury to clothing or hands. Packages shall be packed 24 to the case.

Marking—Unless otherwise specified, shipping containers shall be marked with the name and type of product, the net weight of the product, the gross weight of and volume occupied by the container, the date of processing, the name of the contractor, the number of the contract or order, and date of packaging. Ink used in marking containers shall take on wood or fiber and shall be water-fast and sunfast.

NOTE: Dehydrated cranberries when packed in solid-fiber shipping cases, as specified above, will have a gross weight of 33-lb. and will displace approximately 1.12 cu.ft. When packed in wood, as specified above, the shipping case will have a gross weight of approximately 37.5-lb. and will displace approximately 1.28 cu.ft.

Dehydrated Apple Nuggets

The following specifications, of the issue in effect on date of invitation for bids, form a part of this specification:

Federal Specification Z-A-613—apples, evaporated or dried.

Tentative U. S. Army Specification No. 22–42, "Supplies, Subsistence, for the United States Army, Conditions Governing the Purchase of."

U. S. Army Specification No. 100–2, "Standard Specifications for Marking Shipments."

Quartermaster Corps Tentative Specification, OQMG No. 12-A, "Packing for Overseas Shipments."

Material

The evaporated or dried apples used for dehydration shall meet the requirements of Federal Specifications Z-A-613 for Grade C choice evaporated or dried apples The dehydrated product shall be prepared under sanitary conditions and in accordance with best commercial practice.

General Requirements

All deliveries shall conform, in every respect, to the provisions of the Federal Food, Drug and Cosmetic Act, and regulations promulgated thereunder. The product and packages shall be free from insect infestation.

Detail Requirements

The temperature and humidity of the air during dehydration shall be such that the product will not be scored or otherwise damaged.

The dehydrated product, when rehydrated, shall have the natural characteristic color and flavor of the fresh product. The moisture content of the finished product shall not exceed 3 percent by weight. The dehydrated product shall be practically free from skin, seed and core; and free from worm damage, rot, mold, grit or other foreign materials.

Inspection and Tests

Inspection shall be made at the point of origin, unless otherwise specified. Moisture determination shall be made by the vacuum-oven method by drying 2 grams of the product at 70 deg. C. for 6 hours in partial vacuum having a pressure of not over 100 mm. mercury.

Packaging

Packaging—Unless otherwise specified, dehydrated apple nuggets (crisps) shall be packaged in one of the following types of containers:

1. A 5-gal. square can, which is approximately 9-$\frac{3}{8}$ in. in width and 13-$\frac{7}{8}$ in. in height.
2. A 30-lb. frozen egg or fruit can, with both top and bottom double seamed. This can is of 4-gal. capacity and is approximately 9-$\frac{7}{8}$ in. in diameter and 12-$\frac{3}{8}$ in. in height.

Container Construction

Containers shall be of one of the following constructions:

1. Body of hot-dipped tinplate (107-lb. plate with 1.25 lb. tin coating per base box) with ends of chemically treated black plate or electrolytic tinplate (107-lb. plate with not more than 0.5 lb. tin coating per base box), body seam to be soldered, top and bottom seams to be compounded or soldered, outer surfaces of the ends protected against corrosion by the application of a corrosion resistant coating of lacquer or enamel.

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2. Body of electrolytic tinplate (107-lb. plate with not more than 0.5 lb. tin coating per base box) with ends of chemically treated steel, body to be soldered, top and bottom seams to be compounded or soldered, the ends enameled on both sides.

3. Body and ends of electrolytic tinplate (107-lb. plate with not more than 0.5 tin coating per base box), body seam to be soldered, top and bottom seams to be compounded or soldered, all outer surfaces protected against corrosion by the application of corrosion-resistant coating of lacquer or enamel.

4. Body and ends constructed of chemically treated black plate with side seam soldered, and with both ends seamed or soldered to the body in order to provide moisture-vapor-proof seams. The inner surfaces shall be coated or treated in such a manner that the contents will not be affected deleteriously. The outer surfaces shall be protected against corrosion by the application of a corrosion resistant lacquer or enamel coating.

The cans referred to in the paragraphs above should be obtained by the contractor with the tops fully open or provided with means for obtaining a hermetic seal by soldering a slip cap cover over an opening (hole-in-cap) of approximately 4 in. in diameter. The opening shall have an outward flange of approximately $\frac{1}{8}$-in. with a debossed recess for the solder to follow and the cap shall have a $\frac{1}{4}$-in. flange.

Labeling—Unless otherwise specified, the label on each container shall be marked with the name and type of product, the net weight in pounds, the month and year of dehydration, name and address of packer, location of processing plant, and specific directions for making applesauce.

Packing

Domestic—Unless otherwise specified, the product shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

Export—Unless otherwise specified, the product shall be packed in nailed wooden, weatherproof solid-fiber, or wire-bound wood boxes complying with Quartermaster Corps Tentative Specification, OQMG No. 12-A. All strap iron and wire bands shall be securely fastened and the ends cut off or secured to prevent injury to clothing or hands. Packages shall be packed two to the case.

Marking—Unless otherwise specified, shipping containers shall be marked with the name and type of product, the net weight of the product, the gross weight of and volume occupied by the container, the date of processing, the name of the contractor, the number of the contract or order, and date of packaging. Ink used in marking containers shall take on wood or fiber and shall be water-fast and sunfast. The two 5-gal. square cans of dehydrated apple nuggets described above, when placed in nailed wooden boxes as specified, will displace 1.81 cu. ft. The estimated gross weight of this assembly is 28.5 lb.

Using Sugar To Best Advantage

(*Continued from page 71*)

of 10 to 15 lb., or 10 lb. of cocoa powder and 5 lb. of bitter chocolate, per 100 lb. flour in short-bread and semihard sweet cookie doughs; it is very seldom used in wire-cut doughs. Table I (Nos. 11, 12) indicates that sugar is increased from 41.84 percent without cocoa powder to 53.06 percent with cocoa powder in short-bread cookie doughs, and from 52.04 percent without cocoa powder to 59.69 percent with cocoa powder in semihard sweet cookie doughs (Table I, Nos. 15, 16). The amounts of soda and acid-phosphate base (about 12 oz. of soda and 6 oz. of acid phosphate base per 100 lb. of flour) are the same in the doughs with and without cocoa powder. Consequently, the sugar content is not affected by these leaveners, as will be explained later. However, if soda is increased, the sugar can be decreased as in the case of chocolate semihard sweet cookies. On the other hand, soda is not used to decrease sugar in coconut cookie doughs. Actually, soda is usually decreased so that the pH in the finished product will be slightly on the acid side; the pH of coconut macaroon listed in Table I is 5.9.

Part II of this article will be published in Food Industries *for July.*—The Editors.

References

[1] Whitman Rice, Sugars in Bread, *Cereal Chemistry*, vol. 15, 672-677, 1938.

[2] C. H. Bailey, Protein Surveys of American Hard Spring and Soft Winter Wheats, Technical Bulletin 147, University of Minnesota, 1941.

Good Jams Can Be Made From SO_2 Treated Fruits

(*Continued from page 68*)

those made of sulphur dioxide treated berries were third, but the differences were slight. The small amount of residual sulphur dioxide (up to 50 p.p.m.) left in the berries was undoubtedly sufficient to affect the color and taste somewhat.

The deep purple color of the youngberries was not greatly affected by either of the methods of preservation, nor was the flavor, which is very difficult to mask or destroy. In spite of the rating given to products made of sulphur dioxide treated youngberries, this fruit is especially well adapted to this method of preservation.

When youngberries are treated with sulphur dioxide, they lose about half of the juice through leakage, but softening

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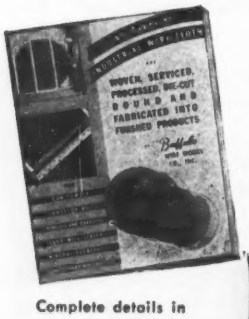

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and flabbiness are not as apparent as in strawberries and peaches.

In general the use of firming agents was of no great value. The fruit is so constructed that a breakdown of the berry does not result in a pulp, as with strawberries and peaches, but in the separation of the individual drupes from the torus. The appearance of many separated drupes is not objectionable when they are mixed with some whole berries, but when the drupes have separated from the torus, the use of calcium may make the latter so firm as to be objectionable in the preserves. When very ripe youngberries are used, calcium carbonate will impart firmness without undue toughness in the tori. The firming agents tested, calcium carbonate, oxide, chloride, sulphate and phosphate, had no effect on the eating qualities of the preserves and jams.

Mixed Fruit Preserves

Preserves made of youngberries were outstanding in flavor, color, texture, and appearance, and these preserves jelled readily. Peach preserves were mildly flavored, were frequently too sweet, and never jelled except in the case of the Mayflower variety. Strawberry preserves did not jell, but were highly colored and flavored, with a very pleasing balance of sugar, acidity and tartness. In order to bring in the desirable qualities of two or more of these fruits, several combinations were made.

Youngberries greatly improved the flavor and color of peach preserves when used in a wide range of proportions. Strawberries served in the same way, but to a smaller extent. Very pleasing products resulted when either berry comprised one-third of the total fruit. Another good product contained 45 percent total fruit, made up of peaches, youngberries and strawberries in the ratio of 4:1:1. The flavor of strawberries is more pronounced than that of youngberries or peaches. A very desirable product was obtained by using strawberries and peaches in the ratio of 3:1.

Peaches and strawberries together do not jell without added pectin, but a fairly satisfactory jell was obtained by adding youngberries to either or both of these fruits. There is little to be gained by mixing youngberries with strawberries, other than the jelling of the product. With as little as one part youngberries to four parts strawberries a satisfactory jell was obtained.

References

1. H. B. Cronshaw, How the British Make Jams, *Food Industries*, vol. 13, pages 74–76, June, 1941.
2. Definitions and Standards for Food Products for Use in Enforcing the Food and Drugs Act, U. S. Department of Agriculture, Food and Drug Administration, Service and Regulatory Announcements, Food and Drug No. 2, November, 1936.

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FORMULAS FOR FOODS

FORMULA NO. 406

Liver and Cheese Loaf

Fresh pork livers	20 lb.
Veal trimmings	15 lb.
Regular pork trimmings	20 lb.
Beef trimmings	35 lb.
Pork cheek meat	10 lb.
Dry milk solids*	10 lb.
Salt	3 lb.
Invert sugar	3 oz.
Fresh onions	3 lb.
White pepper	7 oz.
Ground caraway	1½ oz.
Garlic powder	¼ oz.
Swiss cheese**	10 lb.

* Not over 1½ percent fat.

** A cheese that does not melt or run at the temperature required for processing must be used. It is recommended that a cheese made especially for this purpose be employed.

Directions

Grind the pork livers and onions through a 1-16-in. plate. Place in the silent cutter and chop fine. Grind the veal and pork trimmings through a ⅛-in. plate; add to the livers and chop fine. While chopping, half of the salt and invert sugar, and all of the dry milk solids and spices are added to the mixture. Sprinkle the remainder of the salt and invert sugar over the beef trimmings and pork cheek meat.

Then grind the beef trimmings through a ⅛-in. plate and the pork cheek meat through a ⅜-in. plate. Put the chopped and ground meats in a mixer and mix well.

Place the mixture in parchment lined pans, cover, and cook for 3 hours at 160 to 165 deg. F. Chill overnight. Remove the mixture from the pans and stuff in cellulose cases.

Formula from American Dry Milk Institute.

FORMULA NO. 407

Strawberry Chiffon Pie

Egg whites	4 lb.
Fine granulated sugar	6 lb.
Salt	1 oz.
Water	6 lb.
Cornstarch	1 lb.
Granulated gelatine	2 oz.
Strawberries	5 lb.

Directions

Have the egg whites at 65 to 70 deg. F. Start beating the egg whites at high speed, adding 3 lb. of sugar and the salt gradually over a 3-minute period. Shift to medium speed and continue beating for 5 minutes or until a wet peak is formed. Bring 5 lb. of water and 3 lb. of granulated sugar to a boil. Dissolve the cornstarch in 2 lb. of cold water and add gradually to the boiling sirup. Boil until the mixture is clear, stirring constantly.

Mix together the gelatine and 1 lb. of cold water and add this to the hot filling. Continue to cook until the filling boils again, then remove from the fire.

Pour the hot cooked stock over the beaten egg whites and fold together, using a hand wire whip. Then carefully fold in the finely chopped strawberries. Immediately after the filling is completed, place in prebaked pie shells.

Formula from Lever Bros.

FORMULA NO. 408

Household Soup Cubes

Potato flour	56 lb.
Corn flour	56 lb.
Pea flour	48 lb.
Sago flour	12 lb.
Onion powder	12 lb.
Salt	18 lb.
Gelatine	12 lb.
Beef extract	12 lb.
Worcestershire sauce	5 lb.

Directions

Mix and regrind the ingredients, except the beef extract, Worcestershire sauce and sago flour. Heat and stir the mixture and add the sago flour. Then add from a dripper the beef extract dissolved in the hot sauce, heating and stirring continuously till dry. Press into cubes and wrap.

Formula from H. B. Cronshaw, Surry, England.

FORMULA NO. 409

Cream Whipping Mixtures

To prepare "whipped" cream from light cream, a calcium sucrate solution may be used. Stir up slaked lime and water, about 10 parts of lime to 100 of water, then add sugar so that the final ratio of sugar to water is 3 to 2. This is best separated by centrifuging.

Another method is to dissolve 2½ parts by weight of cane sugar in 5 parts of water, then add a solution made by straining 1 part of quicklime slaked with 3 parts of water. Shake, allow to settle, and siphon off the supernatant liquid.

The calcium sucrate solution is added to cream in the proportion of ½ to 1 teaspoonful in ½ pint of light cream. The cream should be preferably be aged in the refrigerator for two or three days. The whip is not as fast as with heavy cream, and it does not stand up as well.

Cream cheese can be added to light cream in the proportion of 3 oz. to a half pint, for the same purpose. This amount of cream cheese, used together with the calcium sucrate, is said to be "infallible."

For hot gingerbread, hot pies, and so forth, use whipped cream cheese, in the proportion of 3 oz. of cream cheese and 3 tablespoons of cream. Whip the same as heavy cream. This stands up much better than the whipped cream.

FORMULA NO. 410

Raisin Whole-Wheat Cookie

Brown sugar	3 lb. 12 oz.
All-purpose hydrogenated shortening	1 lb. 8 oz.
Salt	½ oz.
Soda	¾ oz.
Dry milk solids	10 oz.
Cinnamon	1¼ oz.
Raisins	1 lb. 4 oz.
Water	1 lb.
Ammonia	¾ oz.
Vanilla	to taste
Cake flour	2 lb. 8 oz.
Whole-wheat flour	2 lb. 8 oz.

Directions

Cream the sugar, shortening, salt, soda, dry milk solids and cinnamon together thoroughly. Grind the raisins and add to this mixture, mixing thoroughly. Dissolve the ammonia in the water, add to the mixture, and mix a few turns. Finally put in the flours. Mix smooth.

These may be made as machine or bag cookies. Bake at 375 deg. F. on lightly greased pans.

Formula from Wilson & Co.

FORMULA NO. 411

Tomato and Onion Spread

Fresh tomatoes	40 lb.
Raw onions	10 lb.
Sugar	5 lb.
Salt	3 lb.
Cayenne pepper	¼ oz.

Directions

Wash tomatoes and dip first in boiling water and then in cold water, drain and skin. Pass through an 8-mesh sieve into a steam-jacketed kettle. Peel and cut up the onions. Pass the onions through a fine grinder, then add to the tomatoes, together with the other ingredients. Stir well and bring gently to a boil.

Fill into jars at not less than 180 deg. F. and seal.

Formula from H. B. Cronshaw, Surrey, England.

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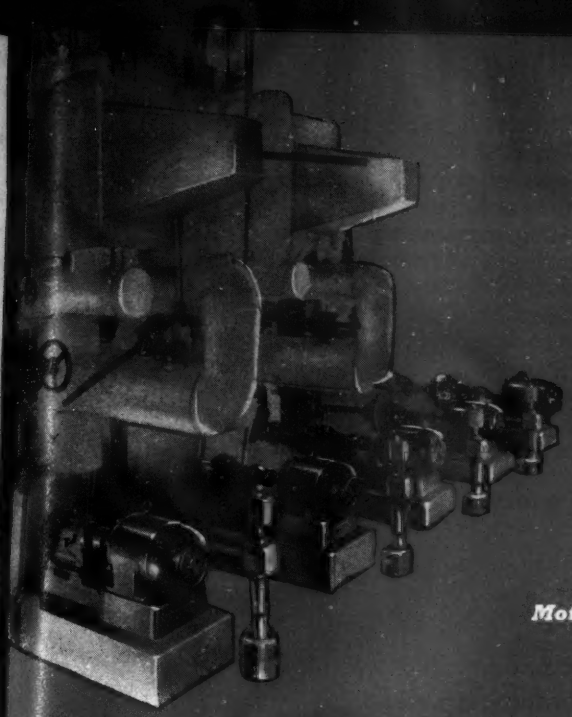

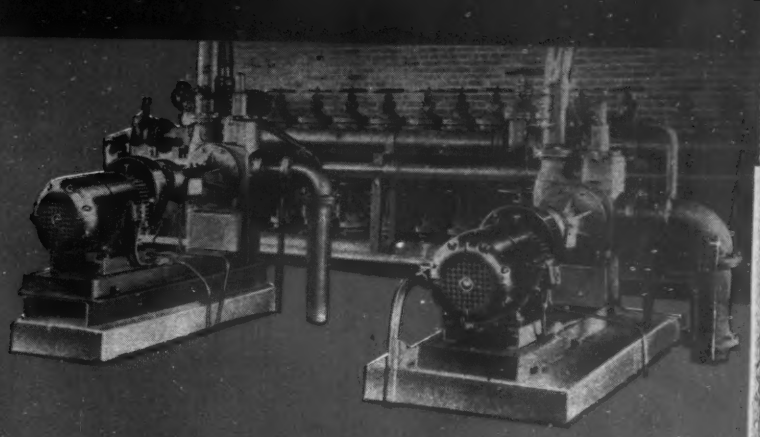

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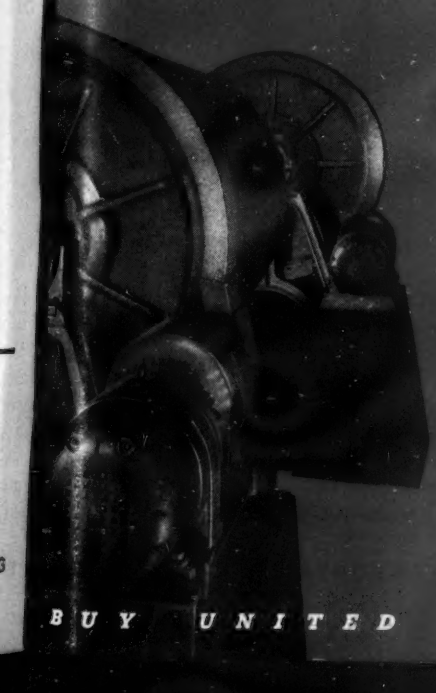

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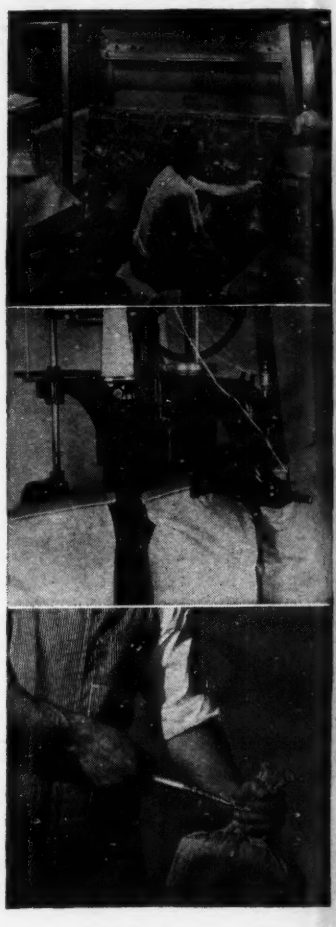

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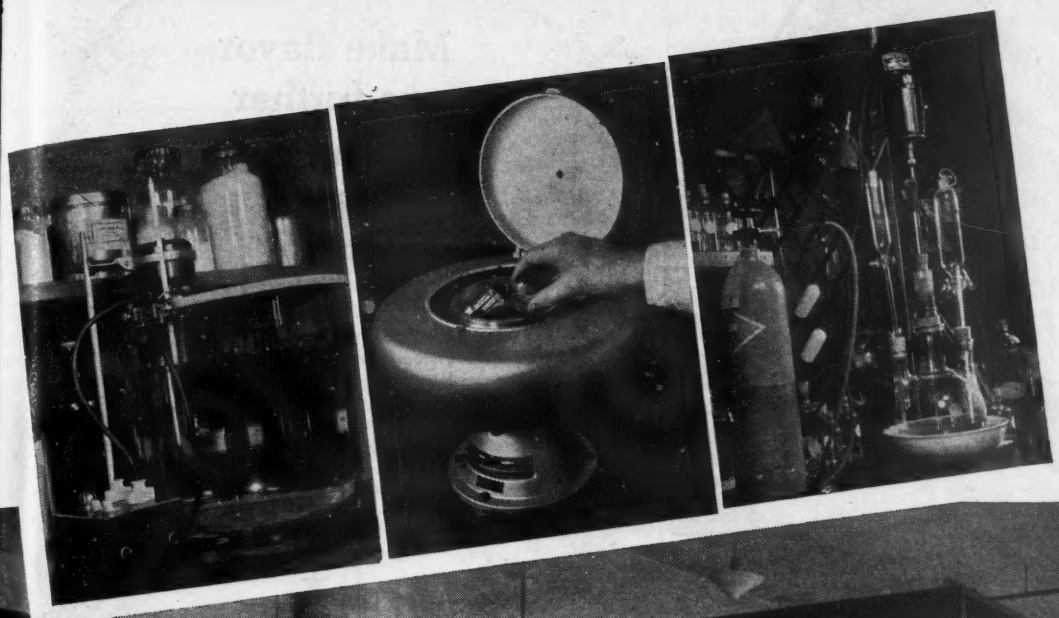

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Advertising that is read with this thought in mind, may provide the solution to a problem that has kept you awake nights for weeks.

Remember, back of the signature of every Food Industries' advertiser is another organization, whose members have thought long and hard about your business in the course of introducing and applying their products and services to your industry.

If their offerings can improve the quality of your company's product ...or save your company's money... they can contribute to your company's income.

We all know, "It pays to advertise." It pays just as big to investigate *what is advertised!*

Each month, Food Industries' advertisers, old and new, invite you and over 14,000 other readers to investigate further the advantages they can provide.

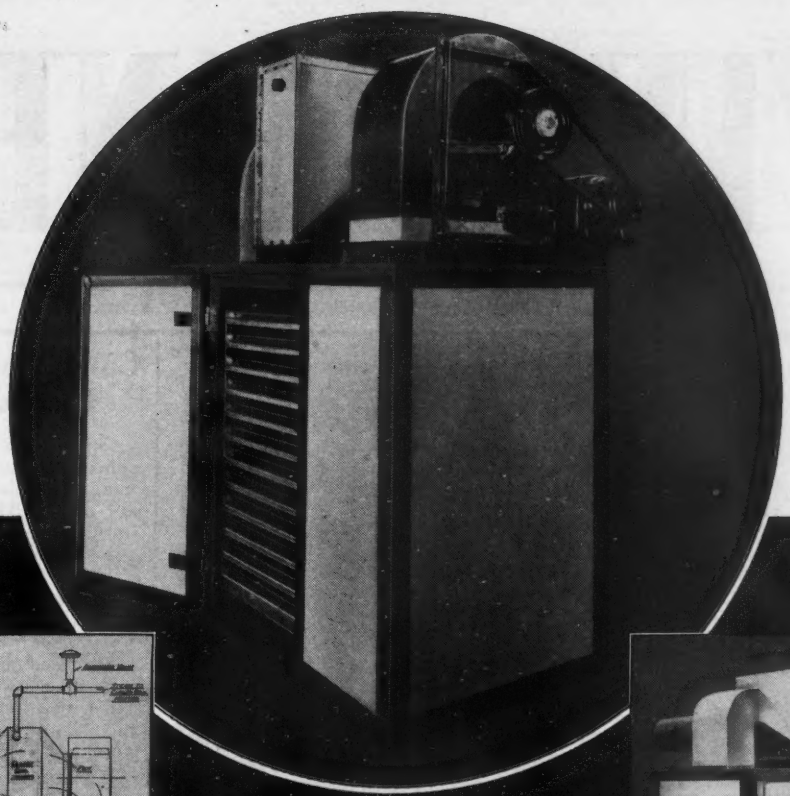
FOOD INDUSTRIES

QUAKER CITY COLD STORAGE CO.
PHILADELPHIA, PA.
3 WAREHOUSES 3
Proper Temperature For Frozen Foods

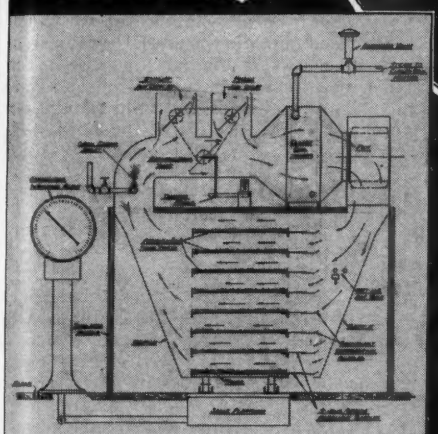
Your inquiry will have special value . . .

if you mention this magazine, when writing advertisers. Naturally, the publisher will appreciate it . . . but more important, it will identify you as one of the men the advertiser wants to reach with his message.

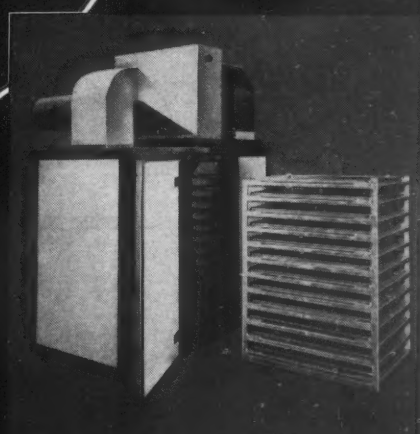
Unit for a New England packer of chowders, fish cakes, etc.



Cross section showing movable air ducts meshing with sides of trucks.



Showing truck ready to roll into chamber.



The Fleet Line

Something New and Better in DEHYDRATION!

THIS MACHINE is the first in a line of dehydration equipment which is being developed by our engineers. It reflects in its efficiency our many years of drying experience in other industries and the intensive research which we have more recently conducted in the food industry.

The cabinet type of machine shown here, made with capacities from 100 to 2000 lbs., provides a maximum flexibility. It is suitable for dehydrating fish chowder, clam chowder, ready-to-fry cod fish cakes, and many kinds of vegetables and meats in sliced, cube or string form. Changes in drying time or other operating conditions do not disrupt its production.

Food is placed on perforated trays in trucks, which roll into the dehydrating chamber on depressed tracks. Trucks fit flush against the back wall, and the front door and mesh on the sides with movable air ducts. Thus the air can not short circuit. It MUST pass over the food between the trays.

Drying time, temperature and humidity are automatically controlled in any combination desired. Circulating fans are variable speed to control volume of air.

Further information on request.

FOOT OF SUFFOLK STREET

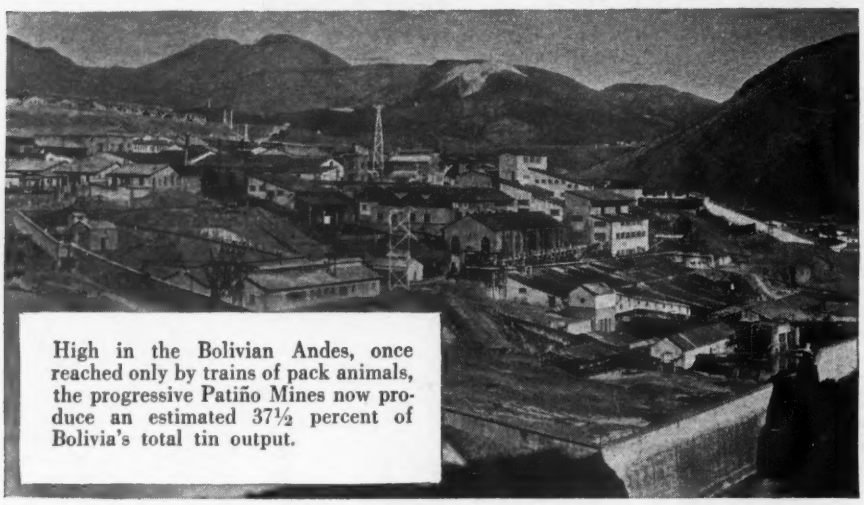
RIGGS AND LOMBARD

INCORPORATED

LOWELL, MASS.

INSIDE NEWS

JUNE PREPARED BY NATIONAL CAN CORPORATION, NEW YORK, N. Y. 1943



High in the Bolivian Andes, once reached only by trains of pack animals, the progressive Patiño Mines now produce an estimated 37½ percent of Bolivia's total tin output.

Bolivia Replaces Far East as Source of United Nations Tin

Simon I. Patiño Pioneered Application of Modern Methods to Tin Mining

Tin for containers and tin for the engines of war is available to the United Nations today despite the loss to the Japanese of the tin producing areas of the Far East. Thanks to the determination of Simon I. Patiño to make a real thing out of tin mining in Bolivia, his native land, this Andean Republic has become almost our only source of this strategic metal. It was back in the 1890's that Patiño undertook the colossal job of making the tough, rock-bound Bolivian Andes yield up its tin ores.

Without Bolivia's production of tin, the metal would now be a rare and precious commodity. But the land-locked Republic in the Andes has responded to its opportunity. Whereas in 1939 it produced 27,215 long tons of fine tin, its output this year has started at the level of a prospective 44,000 long tons, and every effort is being made to increase production so that at least the minimum needs of the United Nations will be supplied.

Wresting tin from the mountains is no easy task. Indeed, the difficulties of transportation and the hardness of the rock in which the tin is found have greatly handicapped the mining of the metal in Bolivia when compared to the more easily worked deposits in the Far East. Maine's "stern and rock-bound coast" is lush meadowland compared with the Altiplano, as the interior plateau of the Bolivian Republic is called.

Until Mr. Patiño introduced modern machinery and engineering, tin mining remained primitive, and the output of Bolivian tin was insignificant. But as progress came to the Patiño mines it spread to other mines in Bolivia.

Today the mines of Patiño Mines and Enterprises Consolidated Inc. produce approximately 37 percent of Bolivia's entire output of tin. A tracery of 300 miles of driftways has been bored into Llallagua Mountain. A miniature railway system follows the main drifts, and trolley locomotives haul the ore trains out of the mines to a modern mill where an 80 percent concentrate is produced. Power is provided by a dam and hydro-electric plant in the mountains at Lupi Lupi, and the diesel engines in use there are known as Patiño-type diesels because they have been especially designed for high altitudes.

It has been the traditional practice of Bolivian mines to ship tin concentrates to England for reduction into the "fine tin" of commerce. Although this tin thus goes into the pool available to the United Nations, the United States—with a large consumption of the metal but no production—decided to create as a war measure a more direct source of tin. It therefore negotiated with other Bolivian producers to take all their production; and it has built a smelter at Texas City, Texas, to process these concentrates. As a result of these timely negotiations, nearly half of the free world's production of tin is now processed in the United States.

Some tin is also obtained from the Cornish mines of the British Isles, which date from the Roman invasion of England, from mines in Nigeria, Africa, and other areas available to the United Nations. But the tin extracted from these mines cannot compare with the total tin output of Bolivia. (358)

Compound for Treating Incendiary Bomb Burns

Copper oleate is an ingredient of a recently developed British compound for treating burns due to phosphorus incendiary bombs. The compound is prepared by dissolving the copper in trichloroethylene and sulphonated castor oil.

In use the oil-soluble copper compound is applied by swabbing, pouring, or immersing burned areas. After inactivation of the phosphorus, the area is washed with tepid water, contaminating material swabbed off and an excess of sodium bicarbonate applied. Once acidity is neutralized, accepted methods of antisepsis and mild tanning are applicable for treatment of the burn itself. (359)

Ethylene Gas Speeds Grain Ripening

Final ripening or curing of grain, the result of enzyme action, can be accelerated by treatment with ethylene gas diluted with several times its volume of air. Application of this treatment to underripe combine-harvested wheat immediately after harvesting made it possible to store a large quantity of the wheat in bins without excessive heating, whereas untreated grain spoiled from bin burning in less than 10 days.

When ethylene was applied to shelled corn from freshly harvested ears in the same concentration and manner as were used with wheat, it had practically no effect. (360)

Yam Bean Has Insecticidal Value

Possibilities of the yam bean as a replacement material in the manufacture of insecticides are currently under intensive investigation. In preliminary work samples of seeds from Central and South America and from China have been tested and all have shown marked toxicity. Several thousand acres of the plant are reported to be under cultivation in Mexico, but in other Central American republics cultivation is limited to small plots by local gardeners.

If any substantial supplies of yam beans become available, and if further tests bear out their insecticidal value, they may serve during the 1944 season as a valuable adjunct to short supplies of pyrethrum and rotenone. (361)

* * * * * * *

Blackening of potatoes which often occurs after cooking can be reduced or prevented entirely by storing potatoes at 100 deg. F. for 3 or 4 days immediately after digging and then removing them to normal storage. After such treatment the tubers remain in good edible condition. Blackening is also decreased by boiling the potatoes in acid solutions but in most cases is increased by boiling in alkaline solutions. (362)

NATIONAL CAN

PLANTS: NEW YORK • BOSTON • BALTIMORE • CHICAGO • HAMILTON, OHIO • FORT WAYNE, INDIANA

pH Factor Important In Canned Foods

There appears to be a direct correlation between pH and the growth of staphylococcus aureus in canned foods. When cans were inoculated with the organism and incubated for periods up to 60 days at 71.6 and 89.6 deg. F., no growth occurred in the acid foods, such as tomato juice. In contrast, there was some growth in the semi-acid foods—asparagus, spinach and string beans. And growth occurred in the low-acid groups—beans and corn and shellfish and salmon. (363)

One Reason Our Bombardiers Don't Miss!

CHARGE SPOTTING ASSEMBLY—Inserted in the tail fin of practice bombs, the black powder contained in the charge is ignited when the missile hits the ground. By photographing the resulting puff of black smoke, the bombardier is able to record hits and misses. These containers are manufactured by National Can Corporation for the Army Air Forces. (364)

Ideal Fumigant For Dairy Products

Methyl bromide fumigation is suitable for dairy products. It is toxic to all forms of insect life, including cheese mite and cheese skipper, weevils and roaches and their eggs. It is effective at low temperatures, whereas many other fumigants become ineffective when the temperature drops.

Thanks to its penetrating power, it can be used satisfactorily in vaults, coolers, curing rooms, warehouses or factories tight enough to confine gas. No off-tastes or off-odors are introduced into the dairy products so fumigated. (365)

Technical Topics

"DRY DEATH" FOR INSECTS—A new chemical dust, inert, insoluble in water, non-poisonous and free from danger of silicosis, has been developed in England to kill insects in grain and cereals. A fine, white inorganic powder, it does not adhere to the grain but kills the insects by desiccation—drying them to death. (366)

ALCOHOL FROM SEAWEED—Experiments in Eire with laminarin, a seaweed product, show a high content of glucose and alcohol. Yields of 13 to 16.9 gallons of ethyl alcohol per ton of air dried weed have been obtained. (367)

FLOWER ABSOLUTE FROM COFFEE—The Puerto Rico Agricultural Experiment Station has successfully extracted a flower absolute from coffee-flowers, at a cost comparable to other absolutes formerly imported. Coffee-flower odor is delicate and desirable in perfumery. (368)

AQUEOUS RUBBER CEMENTS in emulsion form are declared to offer advantages in the manufacture of leather and similar materials. Soap is used as a stabilizing agent in the emulsions. The aqueous cements are said to have the advantages of being non-inflammable and avoid the odor and toxicity problems of cements containing organic solvents. (369)

NEW PROTEIN—A new crystalline sulphur-containing protein has been discovered which is very toxic to yeasts and certain bacteria but harmless to small animals. Discovered by chemists of the Department of Agriculture and named "purothionin", the substance is expected to have uses as a food preservative and as a medicinal agent. (370)

pH IN MEAT—The pH in cured pork has a direct influence on the color development in the meat. With a pH below 5 it is impossible to obtain proper color fixation. Moreover, the meat becomes less tender with decreasing pH; moisture loss or shrink increases and the flavor is sour. A pH range of 5.2 to 6 seems best for the meat. (371)

MEAT—A method has been developed to improve the flavor and tenderness of beef and lamb carcasses by covering them with a brine-moistened cloth and insulating bag prior to chilling. (372)

CARMELIZATION PREVENTIVE—Carmelization in orangeade, lemonade, and similar synthetic citrus powders packed in cans and containing a high proportion of citric acid can be prevented by using anhydrous citric acid or substituting glucose for sucrose in the preparation. It was also found that carmelization does not occur, in the absence of added water, if d-tartaric acid is substituted for citric acid. (373)

BUTYLENE has been shown by Russian investigations to have a stimulating effect on the speed of growth of fruit trees bringing them to fruition far faster than when it is not employed. Application of butylene was recommended especially for those areas where the growth season is too short to permit the full maturing of trees due to inclement weather. (374)

PECTIN—As a substitute for water-soluble gums which are imported, pectin has shown promise in certain cases as an emulsifying and thickening agent in foods and pharmaceuticals. Dextrin from grain starches can fill in for some of the natural gums, especially acacia. (375)

COLD TEST—A dye test shows in one minute whether a cold is caused by infection or allergy, according to a report before the American Public Health Association. About 12% of children suffering from cold and bronchial ailments are subject to an allergy rather than an infection. (376)

GLYCERIDE OILS can be stabilized against oxidative deterioration by the addition of a small quantity of phosphorus derivative of polyhydroxy aromatic compound, with subsequent heating to more than 250 deg. F. under less than atmospheric pressure. (377)

FRUIT FLAVORING AND COLORING—Natural aromatic fruit flavoring and coloring are stabilized against oxidative deterioration by the addition of hydroquinone toluhydroquinone, catechol and resorcylaledhyde. (378)

ALCOHOL FROM FLOUR—Alcohol is now being produced from flour in a large American distillery. The plant formerly employed blackstrap molasses imported from Cuba. (379)

Every effort will be made to furnish additional information on these articles. Where such information is not obtainable, we will refer inquiries to the original source of the article. Write to National Can Corporation, 110 East 42nd Street, New York City. Please mention the number at end of article—also name of the magazine you saw it in.

NATIONAL CAN CORPORATION

Manufacturers of

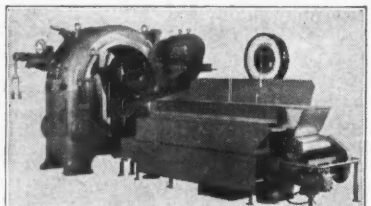
SANITARY PACKERS CANS . PLAIN AND LITHOGRAPHED CANS FOR FOODS, DRUGS, OILS, PAINTS, VARNISHES . STEEL DRUMS AND PAILS

Deliveries Subject to Priority Ratings

(Advertisement)

PREVENTS CORROSION—RESISTS CHEMICALS—LUBRICATES PERFECTLY

CURED A MEAT MACHINE BUILDER'S TERRIBLE HEADACHE!



LUBRIPLATE was instrumental in making this Globe Roto-Cut Meat Processor one of the most valuable engineering achievements in the meat packing, sausage and canned meat industries.

The Globe Company writes us, "We have quite a number of our ROTO-CUT machines in the meat packing industry throughout the country. Until we discovered LUBRIPLATE lubricants, I want you to know that we had a terrible time with the ball and roller bearings used on these machines and that replacement cost ran into a large amount of money.

"We have now had LUBRIPLATE lubricated machines in continuous operation 24 hours a day, 300 days per year for the last two years without a bearing replacement. This is quite a contrast to the two and four week replacements previously encountered with other types of lubricants."

Full text of this interesting and entertaining letter will gladly be sent upon request.

Knowing the conservative attitude of The Globe Company and the high regard in which their equipment is held in the entire packing industry, we are proud to quote from a letter from their Chief Engineer Frank J. Bilek.

Yes, LUBRIPLATE is a remarkable lubricant, different from anything else ever offered to the food industry. It resists rust and corrosion even in the presence of brine and food acids. Machines can be washed down with scalding water without danger of washing LUBRIPLATE out of the bearings. Its tough, protective film arrests progressive wear. LUBRIPLATE is clean, so does not contaminate food.

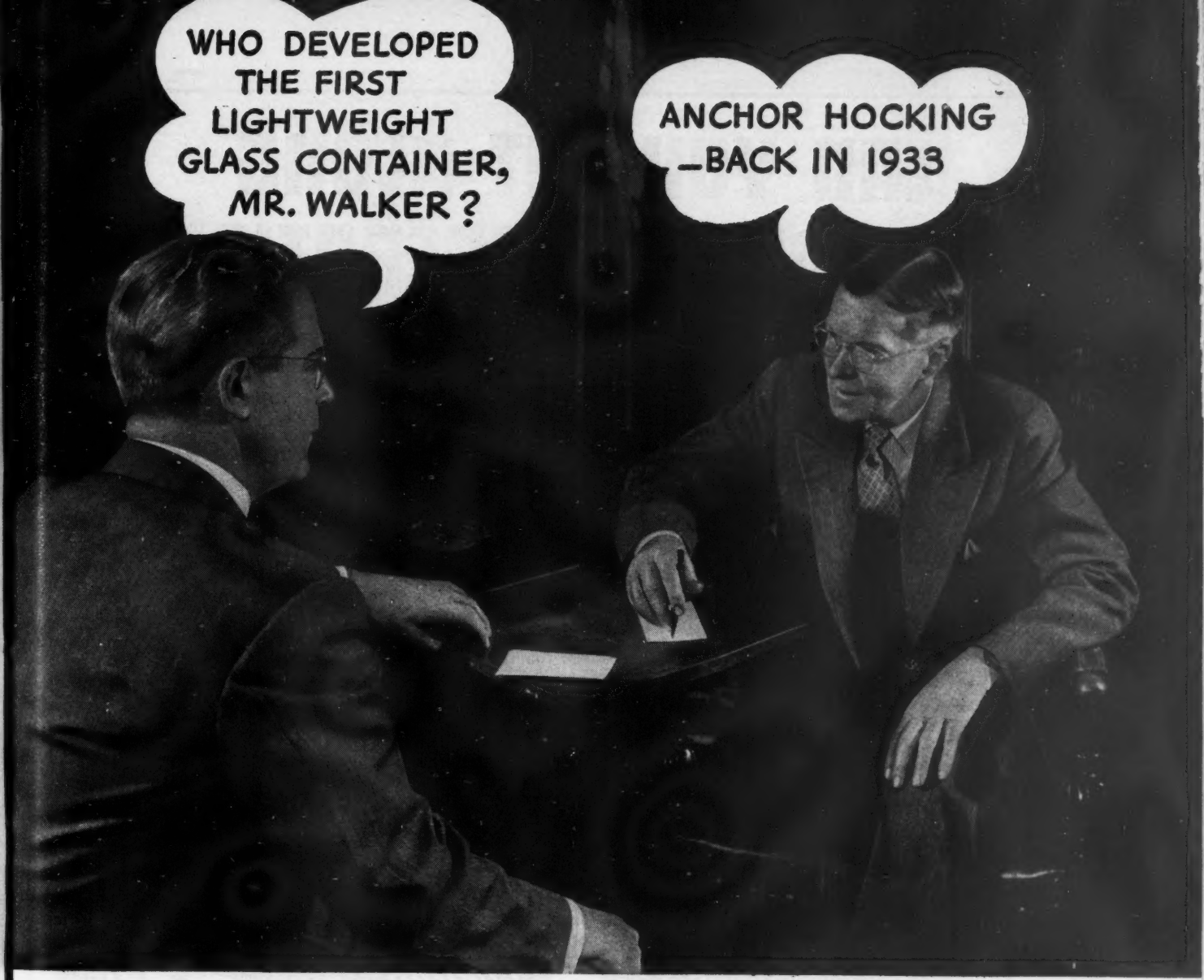
Let us send you a free copy of "The LUBRIPLATE Film" written especially to reduce repairs and replacements of bearings in the food industry.

LUBRIPLATE DIVISION

FISKE BROTHERS REFINING COMPANY

NEWARK, N. J. SINCE 1870 TOLEDO, O.

WRITE FOR THE NAME OF THE DEALER NEAR YOU



Ten years ago, Anchor Hocking engineers developed the world's first really lightweight glass containers for commercial use. As a result of this leadership, new and important features were added to the unsurpassed advantage of transparency—lower freight charges, extra strength, greater resistance to thermal shock, faster processing, less wear and tear on equipment and many other sales, merchandising and manufacturing benefits.

This great "first" was a quart capacity salad dressing jar, lighter by 3½ oz. Others developed shortly thereafter included a pint mayonnaise jar, 2 oz. lighter; one and two pound peanut butter jars, 2½ and 3½ oz. lighter respectively; a 40 liquid oz. coffee jar, 7½ oz. lighter; and a 2½ gallon barrel jar 32 oz. lighter... all forerunners of today's standardized lightweight glass containers.

R. E. WALKER, one of Anchor Hocking's ablest and most popular men, has been a member of the Anchor Hocking family for 37 years.

ANCHOR HOCKING

GLASS & CAPS

ANCHOR HOCKING GLASS CORPORATION · LANCASTER, OHIO

CAN YOU GET ALONG WITHOUT REFRIGERATION FOR THE NEXT TWO WEEKS?

● *"We couldn't possibly!" you exclaim. "That cooling equipment is an indispensable part of our plant. Without it, we'd be sunk. We'd have to shut down!"*

But, *right at this very moment*, there are refrigerating machines—seemingly in perfect condition—yet on the verge of a breakdown. And when it comes, out will go a frantic call for service. Perhaps right then the heavy summer rush and shortage of service men will require you to wait . . . maybe a week . . . or two weeks . . . or *longer*. CAN YOUR PLANT OPERATE WITHOUT REFRIGERATION FOR TWO WEEKS? What happens to production? To storage? Who takes the blame for the costly breakdown? Who pays?

Why run such a risk *for even one hour*, when it's so easy to avoid? All you have to do is phone the BAKER service organization, and ask them to send out a BAKER service man. He's an expert, with service standards as high as BAKER'S unexcelled manufacturing standards. Let him shoulder the whole responsibility of keeping your equipment operating smoothly. *You can depend on BAKER service.* Call him *now*, while you're thinking of it . . . and then relax. You'll have relieved yourself of an important wartime responsibility to your company and your country.

BAKER ICE MACHINE CO., INC., OMAHA, NEBRASKA

BAKER INDUSTRIAL AND COMMERCIAL REFRIGERATION

THE PERFECT PACKAGE

"Glass" with Filma-Seal

The Gutmann screw cap and inner Filma-Seal are applied together in one operation.

Filma-Seal

√tamper-proof
√leak-proof
√evaporation-proof
√moisture-proof
√dust-proof

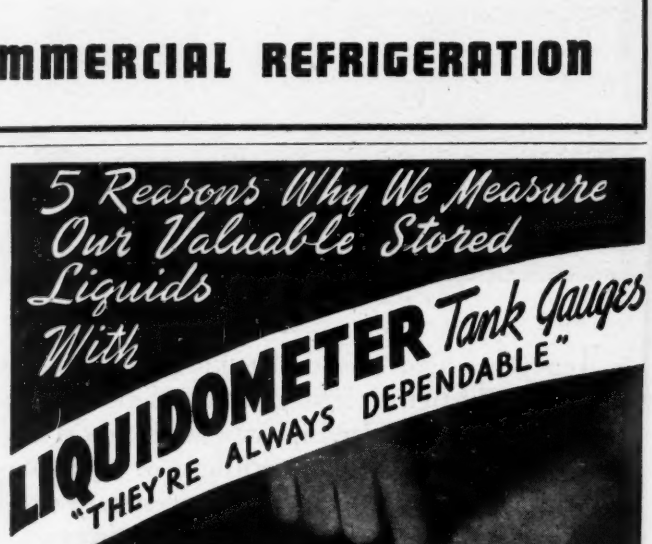
(Reg. U.S. Pat. Off.)

FERDINAND Gutmann & COMPANY
SINCE 1880

3611 14TH AVE., BROOKLYN, N. Y.

5 Reasons Why We Measure Our Valuable Stored Liquids With LIQUIDOMETER Tank Gauges

"THEY'RE ALWAYS DEPENDABLE"



1. 100% automatic.
2. No pumps, valves, or auxiliary units needed to read them.
3. Models available so that readings can be taken remotely from or directly at the tank.
4. Accuracy unaffected by specific gravity of tank liquid.
5. Approved for gauging hazardous liquids by Underwriters' Laboratories and other similar groups.

Write for complete details

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DO YOUR TRUCKS TALK YOUR BUSINESS?

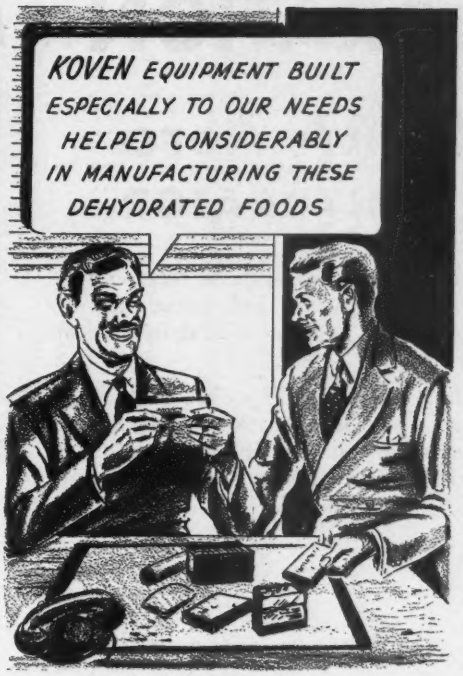
Today, America is Street-bound! Side-walking! Ration-shopping! Looking!—Buying!—America walks . . . but business must still ride to serve. What about your trucks? Do they carry the story of your product, your brand? Be sure they talk YOUR business! Make them representative of YOU!

Careful truck grooming and decoration is good business—and excellent advertising. Cash in on that free space on your trucks with Meyercord full-color Decals. Reproduce trademarks, products, pictorials, slogans, lettering, or patriotic morale builders. Meyercord Truck Decals are weather-tested. They assure uniformity, longer life, higher visibility and faster "over-night" application at a fraction of hand-painting cost. Competent consultation and design service—FREE.

Devote space on your trucks to Bond Sales. Write for details. Photo courtesy of Purity Bakeries.

Address Dept. 1236

WEATHER • TIME AND TORTURE-TESTED
MEYERCORD DECALS
THE MEYERCORD CO. 5323 W. Lake St., Chicago, Ill.



ONLY INDIVIDUALIZED EQUIPMENT CAN KEEP PACE WITH REVOLUTIONIZED METHODS

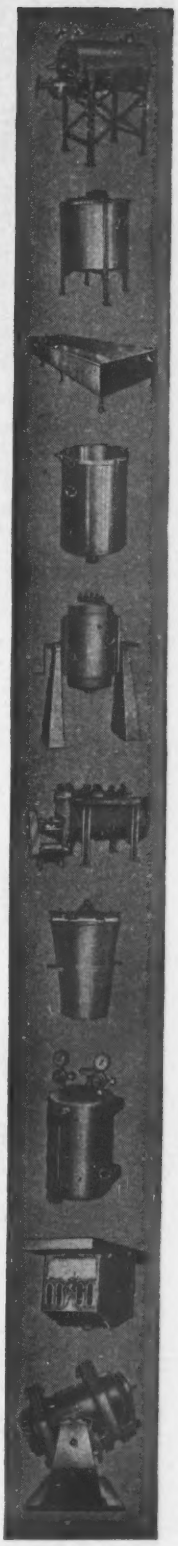
Since war broke out, the food industry has undergone many changes . . . Revolutionized methods such as dehydration have been adopted, requiring equipment conversion. Meanwhile, the nation and our allies urgently called for more food . . . making it imperative that this conversion be as rapid and efficient as possible.

That is why so many food manufacturers turned to KOVEN—depending on their 50 years of designing and fabricating experience to *solve* these individualized problems . . . with equipment built to meet the manufacturer's specific needs . . . and assuring him more efficient, economical production. Consultation with a KOVEN representative regarding your equipment problems obligates you in no way—write or phone today.

Among the many KOVEN products:

- Stainless Steel
- Aluminum Sheet Fabrication
- Boxes, Tote, Waste Cans
- Chemical Apparatus
- Coils and Pipe Bands
- Copper Sheet Fabrication
- Galvanizing Work
- Mixers, All Kinds
- Monel Metal Fabricator
- Pails, Special Heavy
- Pans, All Types, All Metals
- Sinks, Scullery and Factory
- Tables, Galvanized or Monel
- Tanks, All Types, All Metals
- Kettles, All Types, All Metals

WATERFILM Industrial Heating Boilers



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L. O. KOVEN & BRO. INC.
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DEHYDRATION ... *for Uniform, Highest Quality*

NIAGARA Aero
FOOD DEHYDRATOR

● Trustworthy control of temperature, relative humidity and uniform distribution and movement of air are vital requirements of successful dehydration of all food products.

When temperatures within the dryer are controlled by scientific design to a tolerance of 1° at all points, with relative humidities in proportion, quality is improved, production increased and operating costs lowered.

Years of experience with precision air conditioning for the most exacting uses assure these results with NIAGARA Equipment.

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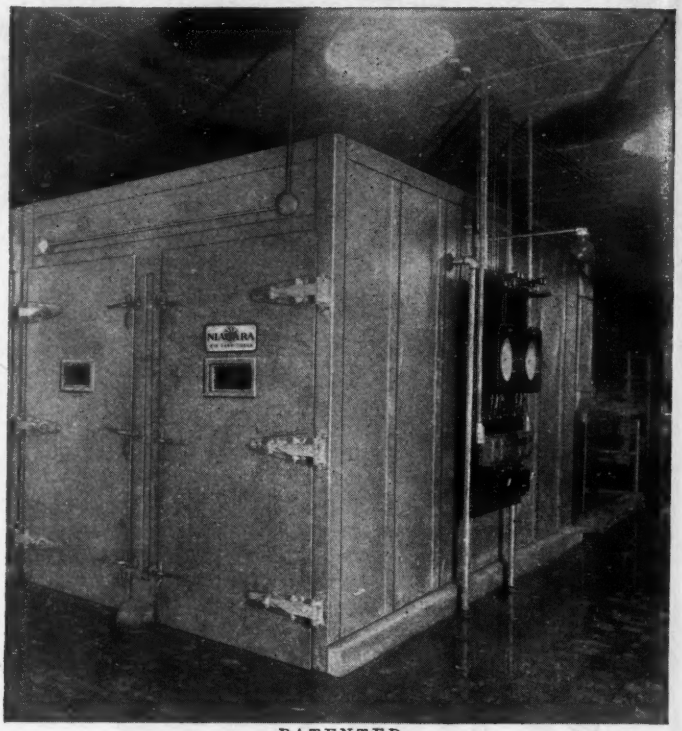

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NIAGARA EQUIPMENT FOR FOOD INDUSTRIES: AIR CONDITIONERS, DEHYDRATORS, COOLERS, "NO-FROST" METHOD OF PRE-COOLING, FREEZING AND HOLDING, AERO HEAT EXCHANGERS, "DUO-PASS" AERO CONDENSERS

Produce OXYGEN and HYDROGEN .. SAFELY

by BURDETT ELECTROLIC OPEN-CELL PROCESS

The Burdett Electrolytic Cell is a closed cell operating in an open steel tank of electrolyte. This design feature makes it possible to immediately detect leakage which is not possible in other standard cells. Gases cannot accumulate to cause explosion hazard. These cells have been proved to be particularly desirable where uncontaminated gases are of advantage — producing oxygen approximately 99.7% pure and hydrogen 99.85% pure. Deterioration of equipment over a long period is negligible. Economical! Reliable!

Request complete information

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BURDETT MANUFACTURING CO. *Oxygen-Hydrogen Generators*

FULLERGRIPT BRUSHES

MEET THE NEEDS OF DESIGNERS, BUILDERS AND USERS OF MACHINERY IN THE FOOD INDUSTRY

FULLERGRIPT Brushes for
BAKERIES
DAIRIES
FLOUR MILLS
MEAT PACKING
FRUIT GRADING
CANDY—ETC.

TO manufacturers and processors of Food: Wherever you use Brushes, consider Fullergript's enduring construction. Conveying equipment, wrapping and packaging, bottling and labeling machinery operate more efficiently with these sturdy, long wearing Brushes.

Also try our standard line of Floor Brushes, Dusters and the famous FULLER FIBER Broom.

The FULLER BRUSH Company
Industrial Division, Dept. 8C
3592 MAIN STREET · HARTFORD, CONN.

Standard Line

FOOD JARS

Glass packaged foods really sell fast. Now there is more reason than ever to pack in glass . . . Uncle Sam has requested it. The new Foster ★ Forbes standard line of jars have smaller closures to save much needed metal . . . are lighter in weight to conserve glass and minimize shipping costs . . . are made in a range of sizes ideal for salad dressings, nut butters, preserves, pickles, fruits, vegetables, etc. If you are going to pack in glass . . . jars or bottles . . . get in touch with us for samples and prices.

FOSTER★FORBES

GLASS COMPANY

MARION, INDIANA, U. S. A.

GLASSWARE OF QUALITY AND CHARACTER

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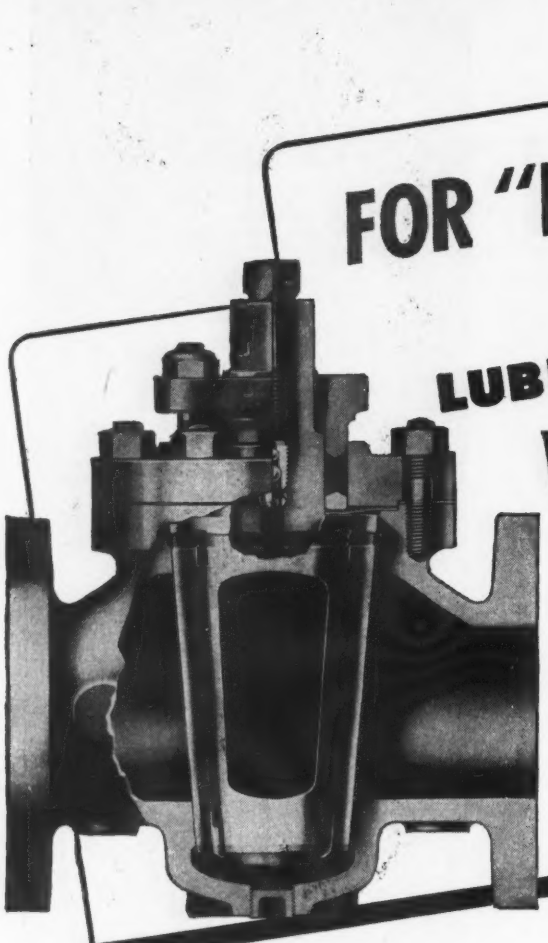
HAVANA, CUBA

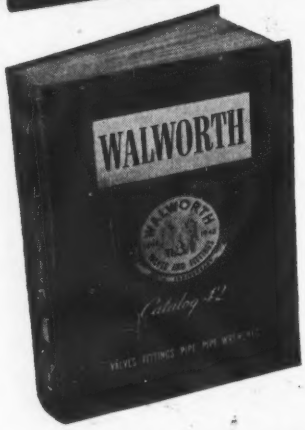
FIT THE VALVE TO THE SERVICE



FOR "DIFFICULT" FLUIDS
USE WALWORTH LUBRICATED PLUG VALVES

1/4 turn to open 1/4 turn to close

GENERAL APPLICATIONS: Acids, Alkalies, Condensate, Dyes, Emulsions, Mercury, Mud, Organic Solvents, Pharmaceuticals, Salt Solutions, Slimes, Slurries and Vacuum, in addition to the more general applications of Steam, Oil, Water, and Gas.



To help you "fit the valve to the service" you'll find pertinent information on Walworth's complete line of valves, fittings, pipe, and pipe wrenches in the new Walworth Catalog 42. Included are 78 pages of practical engineering data that simplify valve selection and make piping layouts easier. Write, on business stationery, for your free copy. Address: Walworth Company, 60 East 42nd Street, New York, N. Y. Department 62.

Here's a valve that will show substantial savings in maintenance and replacement costs on those tough services where the conventional type of valve doesn't stand up.

Walworth Lubricated Plug Valves are of the plug cock type, using insoluble lubricants. Easy operation, tight sealing, and resistance to corrosion and wear are assured by simply turning down the lubricant screw. Pressure, hydraulically exerted on the entire lubricant system, automatically frees the plug from its seat, coats the finished surfaces with a film of protective non-friction lubricant, and seals the ports against leakage.

Although generally an all-purpose valve, Walworth Lubricated Plug Valves are especially adaptable to "difficult" services. Available in sizes from ½ to 24 inches, for pressures from 125 to 5,000 psi, and for all vacuum requirements. They are designed to help you *fit the valve to the service.*

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Pea soup, beef broth and many another steaming bowl of goodness now come to the kitchen as neatly packaged powders. Although these powdered soup mixtures are already volume production, the government has asked dehydrators to up 1943 output to 200 million pounds.

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Buell Powder Collectors specially designed for food processing are made of special metals to meet all Pure Food requirements. Corners are rounded to prevent lodgement of material, and an ingenious hinged construction facilitates take-down for easy cleaning.

The high efficiency of Buell collectors is due to the patented van Tongeren cyclone—an exclusive Buell feature. Buell Powder Collectors have no moving parts, require little or no attention, will not clog, and cost little to operate.

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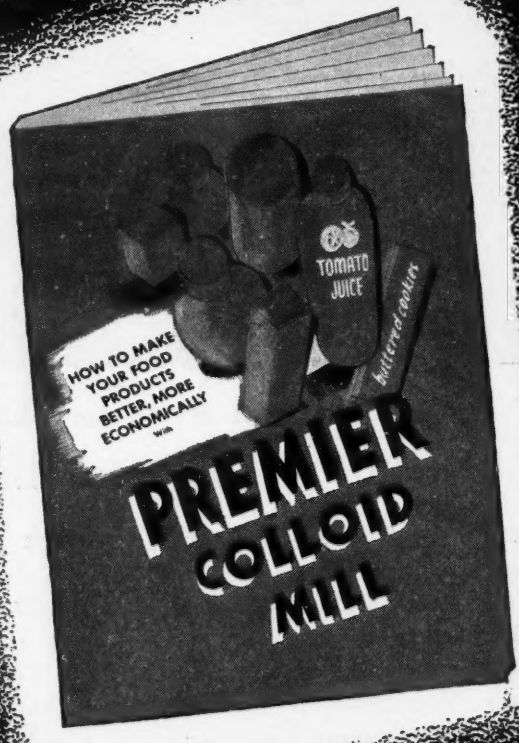
Everyone concerned with FOOD PROCESSING *Will want to Own This Brochure*



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Protection "On the Spot"—Saves Critical Building Materials

Huge stacks of valuable "war food," stored under difficult conditions, must be protected from infestation, quickly, easily and effectively. This big job is being done—frequently "on the spot"—with Dow Methyl Bromide, used in combination with a Dow-perfected plastic-treated tarpaulin. The result—food supplies can be fumigated *anywhere* without using critical building materials for vaults, chambers and warehouses.

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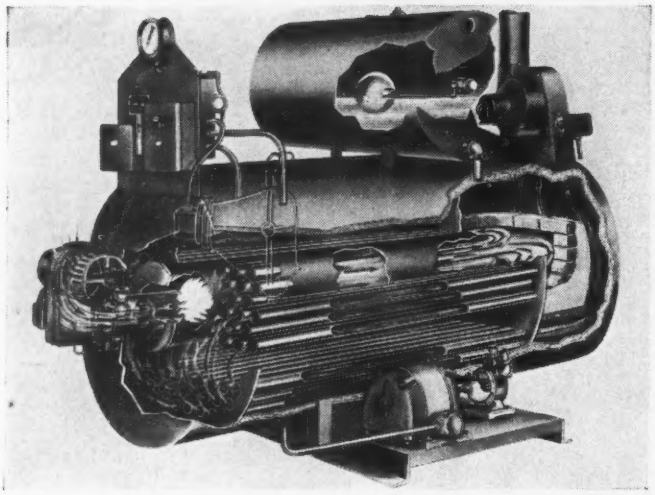

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COMPACT! . . . EASY TO CLEAN!

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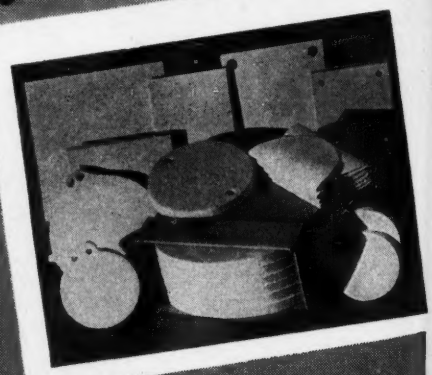

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. . . but a Bryant Dehumidifier in the finishing bin will end your troubles with outdoor humidity

When sticky, humid days slow up final-stage vegetable drying and make you feel like going gunning for the weather man, it's time to put the Bryant Dehumidifier to work in your dehydration system.

No matter what outdoor humidity may be, this equipment supplies the finishing bin with air as dry as you want it to be. It delivers an arid atmosphere in which the humidity is lowered automatically and progressively, as required, to draw that last, hard-held moisture from the product. And, perhaps as welcome as its ability to provide a superior humidity control, is its elimination of need for those hazardous heat increases too often ventured in desperation and paid for in flavor loss or vegetable cell disintegration.

Air is dried artificially in the Bryant Dehumidifier, with moisture being absorbed by silica-gel in a slowly-revolving drum. A gas flame or steam coil drives this moisture from the gel and automatically reactivates it for continuous drying. This positive delivery of dry air has made Bryant equipment a natural auxiliary for practically any dehydration system, as well as an essential in storage and packaging rooms, or wherever it is vital to guard against moisture regain in hygroscopic foods.

Why not, right now, suggest to your air conditioning engineer or engineering contractor that a Bryant Dehumidifier may hold the answer to some of your problems?

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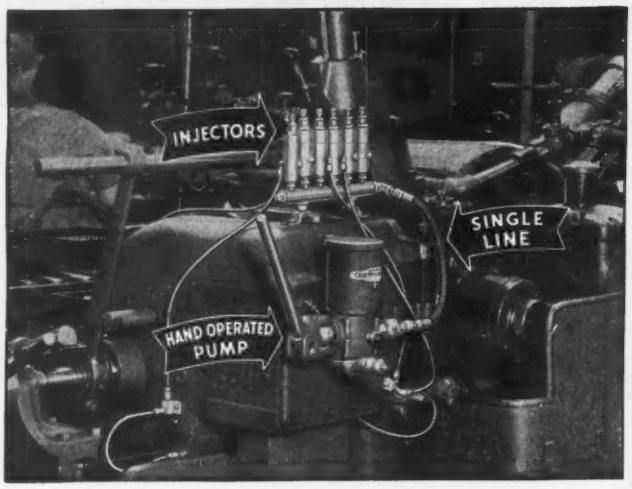
THE BRYANT HEATER COMPANY
17825 St. Clair Ave., Cleveland, Ohio

Equip war production machines with

LINCOLN CENTRO-MATIC LUBRICATING EQUIPMENT



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Avoid machine shut-downs caused by bearing failures... Save machine-hours... Save man-hours —with a Lincoln Centro-Matic System.

This modern Lincoln method of lubrication provides a simple, practical means of delivering lubricant to all bearings of a machine, or group of machines, from a central source—without stopping machines.

A Centro-Matic System consists of a number of Centro-Matic Injectors—one for each bearing—and a power operated or a hand operated Centro-Matic Lubricant Pump. A power operated system can be semi-automatic or fully automatic... Only a single lubricant supply line is required... Easily installed on new or old machines.

Please send us specifications of the machinery to be lubricated. Our engineers will gladly make recommendations.

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ARMY E NAVY

ARMY-NAVY PRODUCTION AWARD for high achievement in the production of war equipment has been conferred upon the Lincoln Engineering Company. It serves as inspiration toward greater and greater accomplishment until the time of final and complete Victory.

143-16

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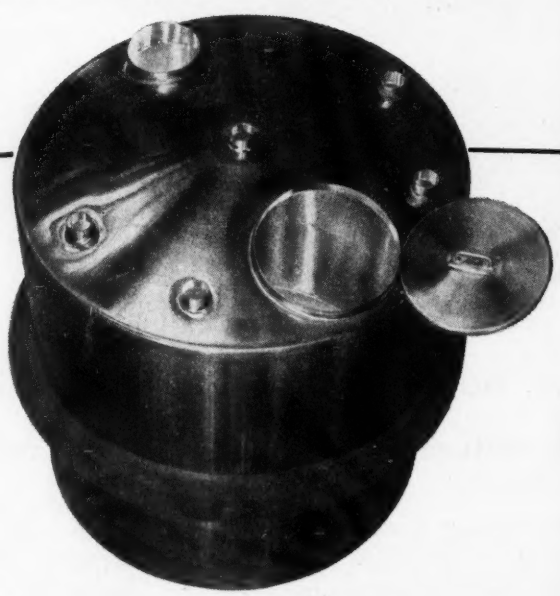

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Custom-Designers of
TANKS, CONTAINERS *for* **ALL INDUSTRY**

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TO START A DEFINITE LAYOUT
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WE'RE LOOKING FORWARD TO

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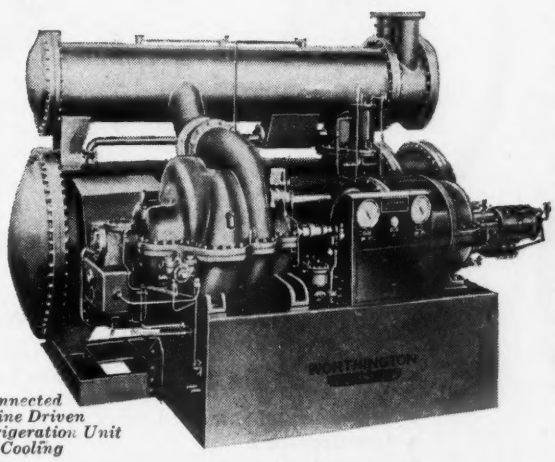
Worthington stands ready to place the time and skill of its application engineers at your disposal, for the working out of sizes and specifications of the equipment combinations which may be required. This will present opportunity also for your becoming acquainted with the advanced design now newly incorporated into various items of our Air Conditioning equipment.

Performance figures based on the latest design improvements will prove most interesting to every food plant engineer contemplating a current or post-war air conditioning installation. Worthington Pump and Machinery Corporation, Harrison, New Jersey. Offices also in Principal Cities.



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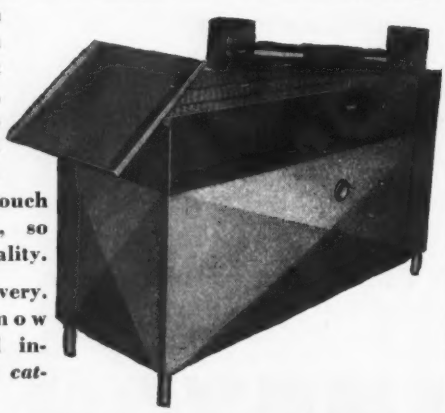

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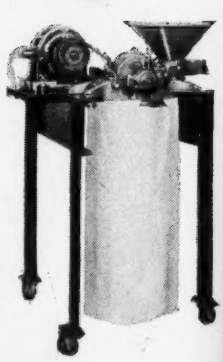

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TESTS A LOT OF THINGS *including Steam Boilers!*

Modern war is a hard taskmaster — men and machines on the production front must set and meet a terrific pace — survive severe endurance tests of their own to "deliver the goods" to the fighting fronts.

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Get full information now—for the future—on Cleaver-Brooks oil-fired steam generators — sizes 20 to 500 H.P.; pressures 15 to 200 lbs.

Two 250 H.P. Cleaver-Brooks Steam Generators as installed at an Eastern aircraft plant.

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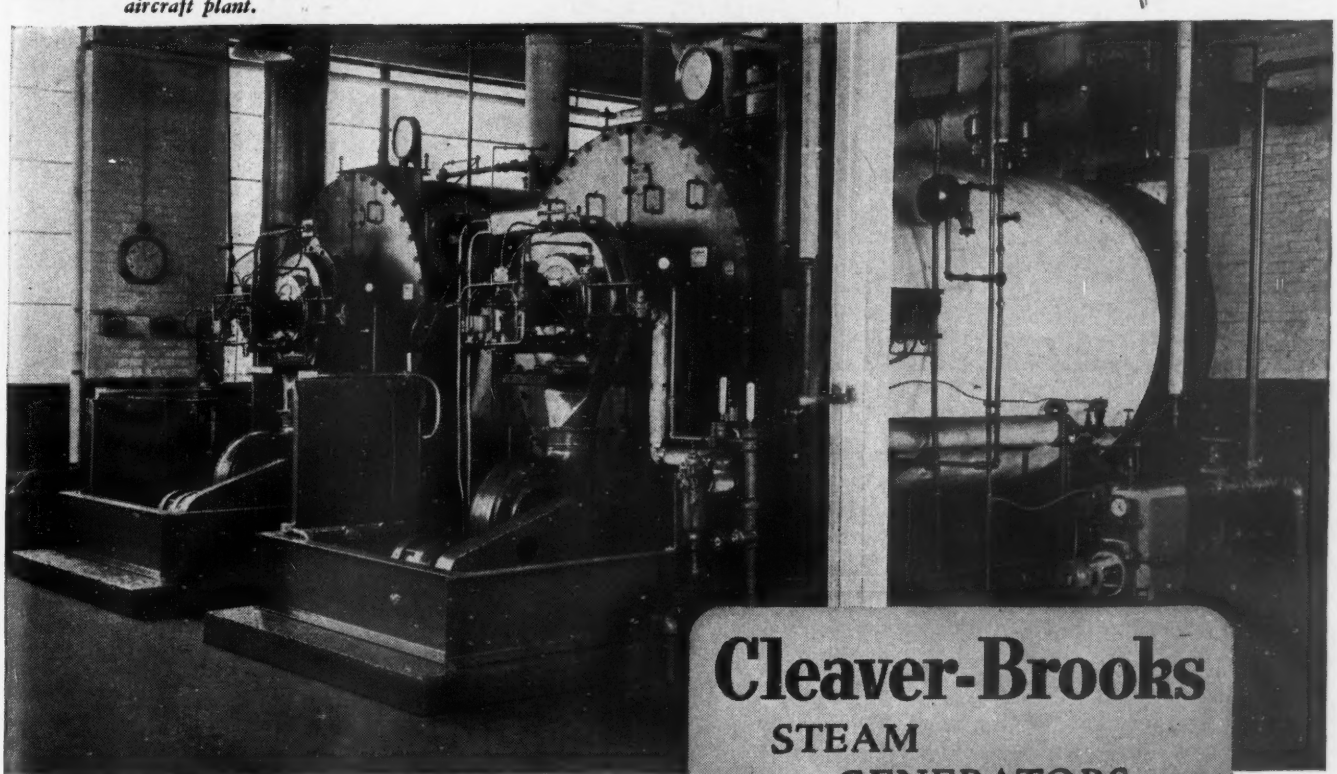

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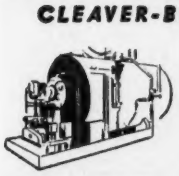
Steam Generators

Food Dehydrators

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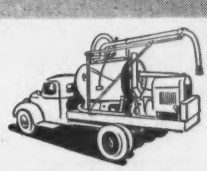
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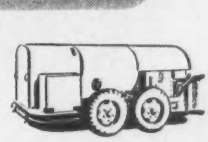
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Enemies Unseen . . . but for the Microscope

Bausch & Lomb microscopes, on every battle-front and at home, are helping to keep America's workers and America's fighters healthy . . . are helping to free them from the menace of invisible enemies.

Into a world otherwise invisible men with microscopes seek out the enemy that hides in the water, the soil and the air . . . help to keep fighting men in fighting trim. At home, their work protects America's industrial army which must, without fail, provide fighting tools for our fighting men.

Bausch & Lomb development of a mass production technique for the manufacture of precision optical instruments first made high quality microscopes available to all.

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Army rations, dehydrated soups and vegetables, drugs, surgical dressings . . . these are just a few of the many vital war supplies for which Milprint is producing **protective** packages. Back of our ability to "deliver the goods" **now** . . . at a time when most needed . . . is Milprint's 45 years of leadership in the packaging industry.

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On the home front, too, Milprint Protective Packages are doing a highly essential job . . . safeguarding the foods which supply healthful energy for America's hard-hitting war workers. Important in peace-time, designing and producing packages for foods is now a necessity . . . requiring all the "know-how" and facilities offered by Milprint's three great plants.

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IN A DESPATCH LABORATORY OVEN

Saves TONS of FOOD

Control Accuracy ±1°C. • To 500°F. (260°C.)
Electrically Heated • Sizes 13"x13"x13" up.

A few ounces of food in a tray, processed in a Despatch oven, gives just the accurate data needed in your food laboratory.

Applied to your production, this data helps three ways:

SAVES HOURS of experimenting with larger samples . . .

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IMPROVES QUALITY of your finished products, assuring ready public acceptance.

In Dehydrating ★ Despatch laboratory oven supplies temperature, time and air-flow data immediately applicable to your full-scale production. Duplicates all heat and air conditions desirable in the best of large dehydrating units.

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In Canning a Despatch laboratory oven may be used for pre-heating selected samples prior to test-processing. Also for laboratory tests of various fruit juices, sirups and for speedy sterilization of glassware and apparatus. Useful in enzyme activity tests.

WRITE TODAY *for your copy of Bulletin 105-P, describing Despatch laboratory ovens. Learn how these ovens can save time and labor in your laboratory.*

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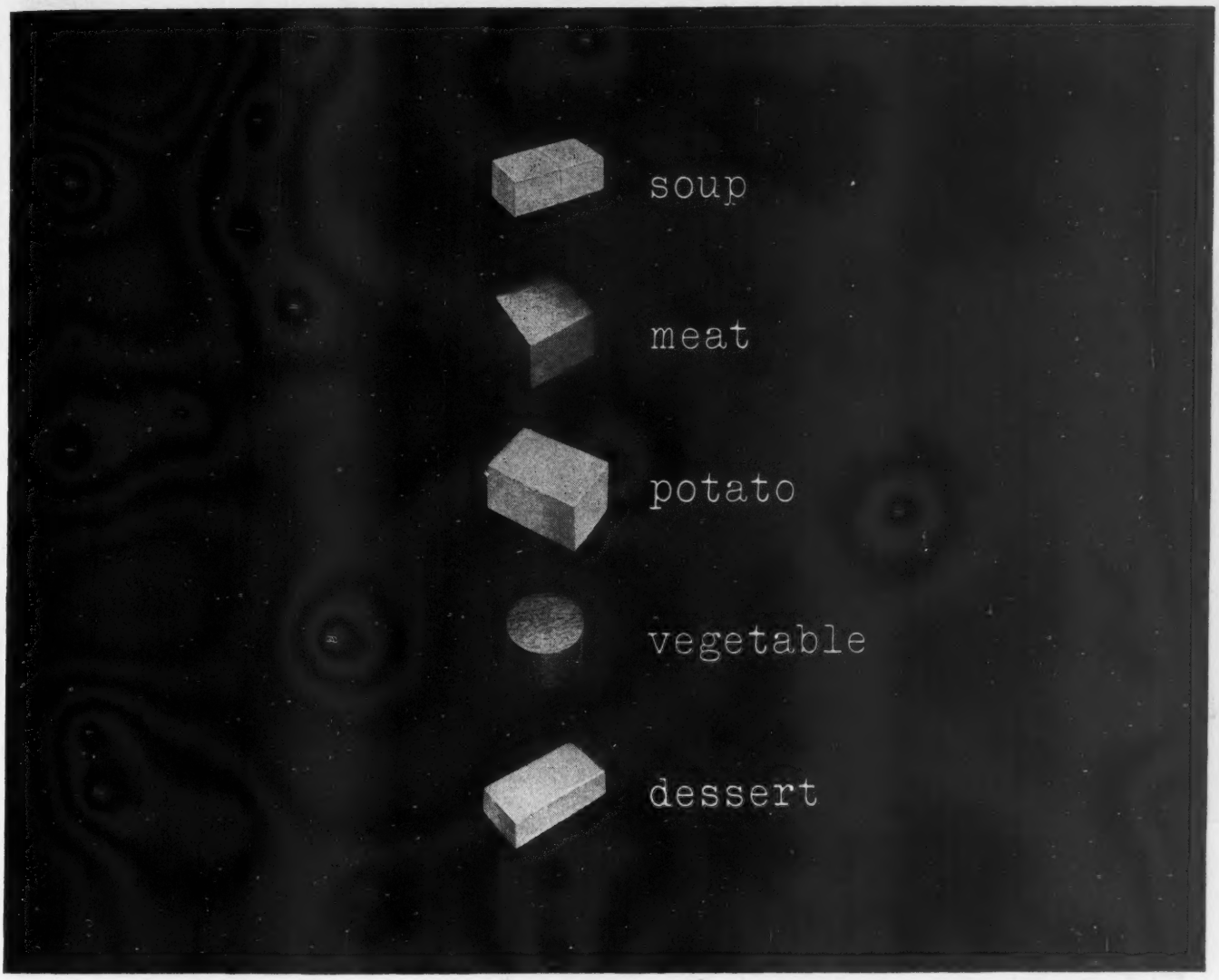
HOW MUCH DOES TEMPERATURE VARIATION COST YOU?

Processing temperatures require frequent checking. To avoid the variations that waste time and materials, mount MOTOCO Indicating Thermometers at every point in the plant where uniform temperatures must be maintained. These accurate instruments serve to simplify and speed-up temperature observations . . . the indicating head may be mounted where observation is most convenient, at some distance, if necessary, from where the temperature is taken.

For further information write to: The Electric Auto-Lite Company, Moto Meter Gauge & Equipment Division, Chrysler Building, New York, N. Y.

Motoco Indicating Thermometers have rigid stems for direct mounting or may be obtained with capillary tubing for remote reading. Model F-1, illustrated, $20. • Motoco Recording Thermometers are priced from $31.

MOTOCO
INDUSTRIAL THERMOMETERS



DINNER FOR EIGHT

• Still more important . . . Dinner for Eight Million.

Eight million American boys, all over the earth, fighting to preserve the peace and tradition of Dinner for Eight.

Already, huge quantities of dehydrated foods have been sent to our fighting forces and our allies overseas . . . already far-sighted food processers are planning for the day when a week's marketing will be done in the space of an hour and a handbag.

Carrier equipment, long a vital factor in processing and protecting fresh meats and vegetables, is today equally vital in the successful dehydration of foods.

Carrier engineers are helping to provide the control of air and moisture essential to proper dehydration by:

1. Furnishing air dehydrators, or artificially dried air, to supplement tunnel or batch type dryers and reduce drying time without sacrificing quality.
2. Standardizing methods of preventing moisture regain in hygroscopic foods *after* dehydration and *during* packaging and storage of such products.
3. Engineering multi-stage tunnel dryers to properly utilize successively lower dry and wet bulk temperatures.

Write today for information on the use of Carrier equipment for dehydration of foods.

CARRIER CORPORATION, Syracuse, N. Y.

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AIR CONDITIONING • REFRIGERATION

DEHYDRATION

FORTY-ONE YEARS EXPERIENCE IN INDUSTRIAL INSTALLATIONS

You can build YOUR OWN PACKAGING LINE

with TRIANGLE EQUIPMENT

THE compact, economical packaging line illustrated, virtually tailor made to the user's requirements, is typical of the many possible combinations of Triangle equipment. The Triangle Carton Gluer, Elec-Tri-Pak Weigher, Carton Sealer and Collector Table shown are all individual standard units.

For your needs, Triangle engineers will help you choose from many models of Elec-Tri-Pak Weighers, the world's most complete line of Volumetric Fillers, a complete range of Carton Sealers and all types of accessory equipment to provide you the finest possible packaging installation.

For high speed, completely automatic installations, Triangle offers you "Elec-Tri-Line" packaging, the system second to none.

Discuss your packaging requirements with Triangle — write today and ask for literature.

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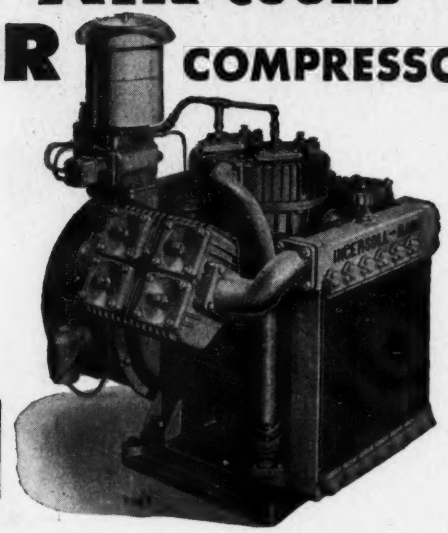
BRANCHES IN PRINCIPAL CITIES

AIR-COOLED AIR COMPRESSORS



Ingersoll-Rand air-cooled air compressors are compact, efficient units that may be easily installed without elaborate foundations. They are available in sizes from ½ to 90 horsepower. Piston displacements range from 1 to over 500 cu. ft. per minute. Pressures range from vacuum to 1000 lb. per sq. inch. Various types of mountings are available to suit the requirements of a particular installation. INGERSOLL-RAND COMPANY, 11 Broadway, New York, N. Y.

1-274 **Ingersoll-Rand** FOR COMPRESSED AIR

WANTED:

Creative research expert . . . new food products

Real opportunity with outstanding national manufacturer. Head up comprehensive laboratory research program in development of new packaged food products for grocery distribution. Wanted attributes; Ability to create items and ideas; adeptness at food artistry; food technology experience; previous successful record or reasoned conviction that you can do the job; preferably a chemistry background. Highly desirable, permanent post. Salary commensurate with what you have to offer. Write Editor this publication if you wish to negotiate preliminarily, or reply to

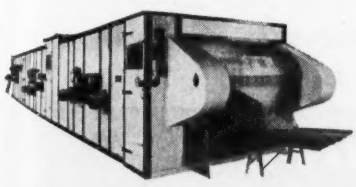
P-146, Food Industries
520 No. Michigan Ave., Chicago, Ill.

CHINES · PROCTOR DRYING MACHINES · PROCTOR DRYING MA

Recognition

PROCTOR DRYERS ARE RECOGNIZED BY LEADING FOOD DEHYDRATORS

The new design Proctor Food Dehydrator consists essentially of a feeding arrangement, an insulated enclosure where proper temperature and air circulation is maintained for ideal results and a conveying system for carrying the foodstuffs through. It is entirely automatic in operation; offers continuous flow of food products; operates with a minimum of supervision under conditions that are accurately controlled. Dehydrating is correct for each food product and up and down air circulation through the bed of foods on the conveyor promotes rapid and uniform dehydration.



Just as more and more people today *recognize* the value of dehydrated foods, so the leaders in the major food industries *recognize* Proctor Modern Dehydrators as machines of the very highest efficiency. The Proctor organization has long been recognized as a pioneer in designing and building drying machinery for the food industries. The latest Proctor Dehydrator, entirely automatic in operation, assures highest quality, absolutely uniform results at lowest production costs. Incorporated are all the advantages developed from years of patient research. What is true of the food industry is true in virtually every major field of production. Whether it be for chemicals, soap, textiles, paints, plastics, veneers or synthetic rubber, there is a Proctor Dryer scientifically designed and custom built to do the job right. If you have a drying problem, now is the time to have Proctor engineers consider its solution toward that day when other-than-war products can be purchased. Naturally, if your product is vital to the war effort we can supply you with new machinery today.

PROCTOR & SCHWARTZ · Inc · Philadelphia

CHINES · PROCTOR DRYING MACHINES · PROCTOR DRYING MA

Insulation for COLD from a Man-Made Volcano!

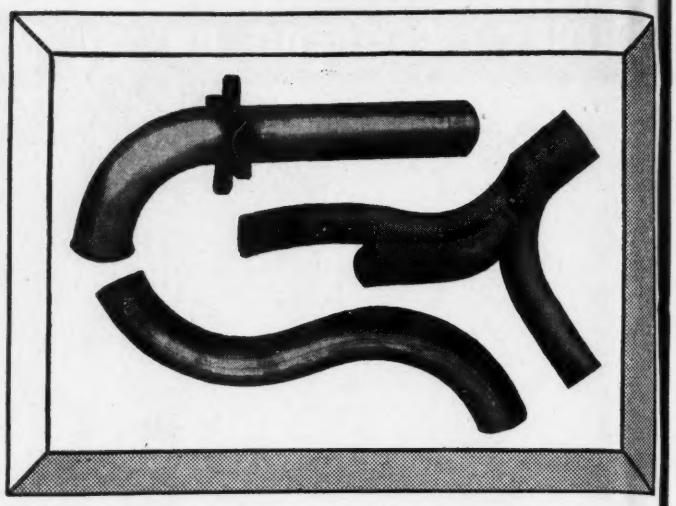
ACCORDING TO LEGEND, the first mineral wool was produced during an eruption of the volcano Kilauea in Hawaii. Geological survey revealed this substance to be lava, blown into soft threads by the gigantic forces of the volcano.

Today, at Johns-Manville factories, in man-made volcanoes, molten silica minerals are blown by means of steam into silky fibers. These mineral fibers are formed into Rock Cork, which is exceptionally efficient for low-temperature insulation. Rock Cork is immune to termites, vermin and mold. It can't rot, does not absorb odors.

Mineral wool is one of four basic materials from which all Johns-Manville products stem: Asbestos, asphalt, diatomaceous earth and mineral wool. Today, Johns-Manville has but one aim: To make these products in the quantities needed to help win the war. Johns-Manville, 22 East 40th Street, New York, N. Y.

JM

Johns-Manville ROCK CORK



5 reasons why it's easy to fabricate Welded Stainless Tubing!

Here are some of the *reasons why* Carpenter Welded Stainless Tubing is easy to fabricate. And today, easier fabrication means *more output . . . fewer spoiled jobs,* even in the hands of semi-skilled workers.

1. *Uniform tube walls* permit the use of lighter gauges, without sacrificing strength. *Lighter gauges* mean easier and faster bending, cutting, expanding, welding, etc.

2. Carpenter Welded Stainless Tubing is naturally *easy to form* because it is made from *ductile* cold-rolled strip, inspected both sides.

3. As only a *minimum of machining* is needed, this tubing helps to reduce tool troubles. Less machining equals time saved and metal conserved.

4. Tube shapes are *natural design units.* Finished parts or connections can often be made by merely swaging, tapering, flanging or expanding.

5. The *uniform structure* of this tubing eliminates production "bugs" before they start. Even the V-shaped weld is chemically and mechanically analogous to the parent metal.

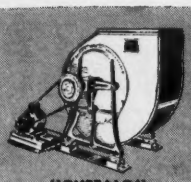
IF YOU WANT STRENGTH . . . Carpenter Welded Stainless Tubing can provide it! This tubing often supports loads once carried by solid bars. It can withstand pressures once handled by heavier-walled tubing. For instance, the test piece shown here (from a regular production run) was "bent double" along the weld—and refused to break.

If you are doing engineering or research work, or if you want help in fabricating Welded Stainless Tubing, ask for Carpenter's QUICK FACTS bulletins. They can help you get the most from every length of this tubing . . . and a note on your company letterhead will start them on the way to your desk.

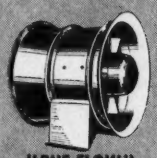
THE CARPENTER STEEL COMPANY

Welded Alloy Tube Division, Kenilworth, N. J.

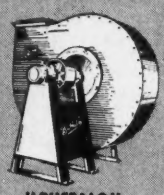
Carpenter WELDED STAINLESS TUBING



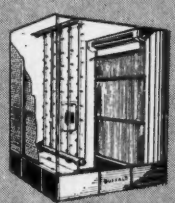
"BUFFALO"
Limit-Load Ventilating Fan



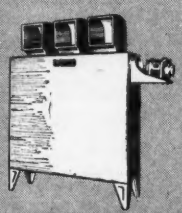
"BUF-FLOW"
Axial Flow Fan



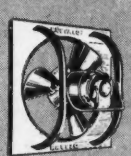
"BUFFALO"
MX Mill Exhauster



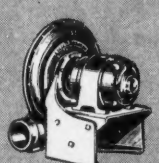
"BUFFALO"
Air Washer



"BUFFALO"
Highboy Unit Heater



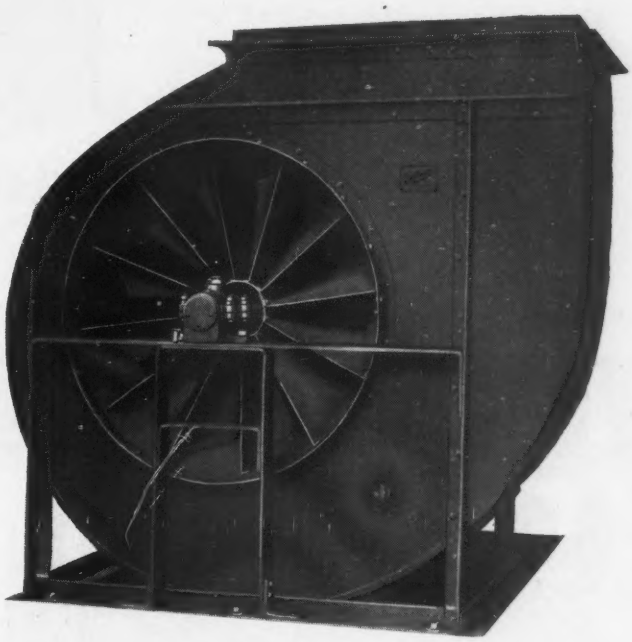
"BUFFALO"
Breeze Ventilating Fan



"BUFFALO"
Type E Blower

"BUFFALO"
Volume Fan

Efficient BUFFALO FANS for DEHYDRATION



THE drying industry, like many others, has expanded rapidly under stimulation of war necessity. In hundreds of plants all over the country food products are being dried in modern new dryers, designed with the latest scientific knowledge of the requirements for this service.

Significant is the fact that so many of these new plants, like so many of the older ones, rely on Buffalo Fans for uninterrupted service on hot air circulation.

Where utmost reliability is important—that's where you'll find Buffalo Fans.

BUFFALO FORGE CO.
152 Mortimer St. Buffalo, N. Y.

Branch Engineering Offices in Principal Cities
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" FANS

Set Up for Bottom Stitching

BLISS TOP and BOTTOM STITCHER

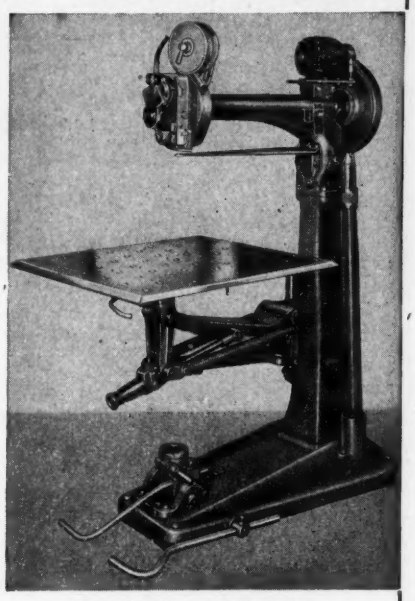
Containers with both tops and bottoms wire stitched are now specified for packing numerous products.

This combination BLISS TOP and BOTTOM STITCHER is recommended for plants whose production does not warrant installation of separate Bottom and Top Stitchers. For assembling cases by bottom stitching, the blade anvil is dropped down against the pedestal and the table is swung to one side as illustrated at left; the post is placed in a socket on the base and locked in position.

After the desired number of containers has been bottom stitched, the post is removed and table and blade anvil swung into position as illustrated at right, for top stitching the filled containers. Less than one minute is required to make the change.

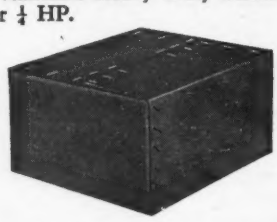
The work table is fitted with ball bearings on which the box may be easily moved in any direction. The table is counter-balanced and is quickly and easily adjustable up or down by hand for boxes of varying heights.

Built in two sizes with 15" and 25" throats, and 26"x30" work table. Handles boxes up to 25" in depth. The standard Heavy Duty Stitcher Head is used. Motor ¼ HP.



Set Up for Top Stitching

Wire stitching both top and bottom provides a uniformly secure closure and gives added strength and rigidity to the case.



Write for further information

DEXTER FOLDER COMPANY

330 West 42nd Street — New York, N. Y.

Chicago • Boston • Philadelphia • Cincinnati

MERCOID

DA

double adjustment.

Temperature or Pressure

AUTOMATIC CONTROLS

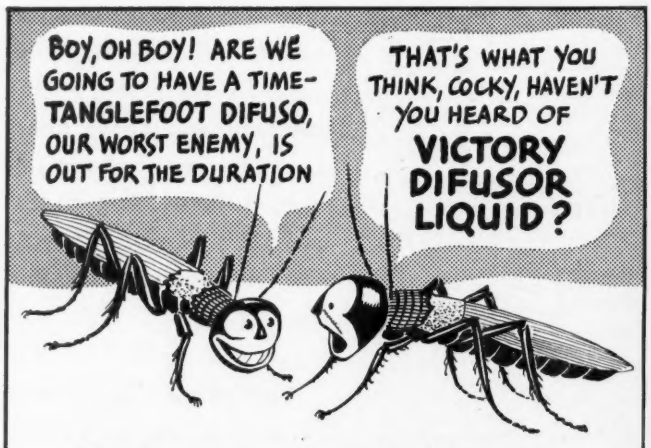
USED IN REFRIGERATION AND DEHYDRATION OF FOOD PROCESSING

Mercoid DA Controls have attained universal use throughout industry. They are adaptable to a wide range of applications and available in a variety of types to meet the demands for accurate control of temperature and pressure.

The distinctive features in Mercoid DA Controls are the corrosion and dust-proof mercury switch; the Bourdon tube actuating element, and the outside double adjustment, which makes it easy even for inexperienced workers to set the operating range of these controls. The direct reading eliminates calculations.

Complete information in catalog No. 600. Write for a copy.

THE MERCOID CORPORATION, 4203 W. Belmont Ave., Chicago, Ill.


BOY, OH BOY! ARE WE GOING TO HAVE A TIME- TANGLEFOOT DIFUSO, OUR WORST ENEMY, IS OUT FOR THE DURATION
THAT'S WHAT YOU THINK, COCKY, HAVEN'T YOU HEARD OF VICTORY DIFUSOR LIQUID?

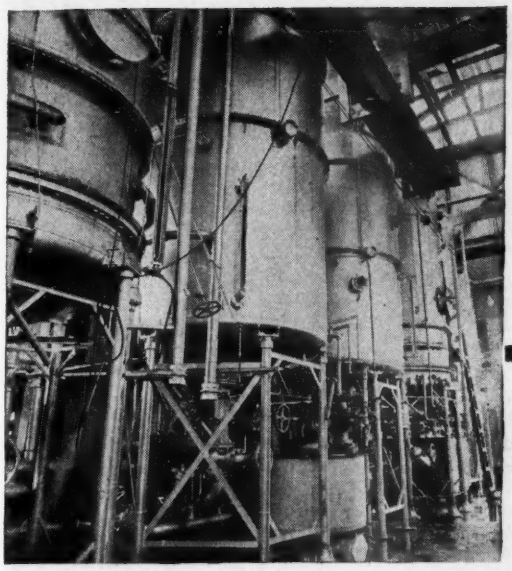
Through almost a miracle of chemistry TANGLEFOOT has finally perfected a satisfactory alternate for genuine DIFUSO. And hence, those lucky thousands who own DIFUSORS will go merrily along enjoying a measure of pest control unequaled by any other means. If you are one of them, ask your dealer for

TANGLEFOOT VICTORY·DIFUSOR·LIQUID

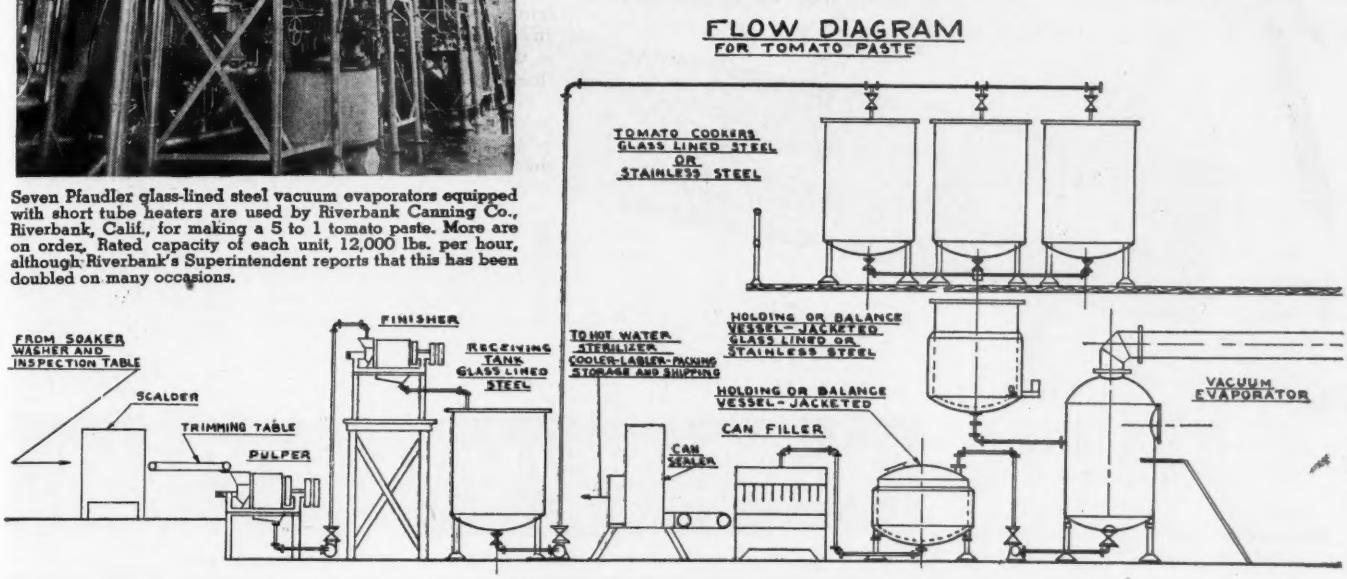
THE ONLY ALTERNATE FOR GENUINE *DIFUSO* WHICH CAN BE SAFELY USED IN YOUR NOW IRREPLACEABLE *DIFUSOR*

THE TANGLEFOOT CO. • GRAND RAPIDS, MICH.

How to produce tomato paste



Seven Pfaudler glass-lined steel vacuum evaporators equipped with short tube heaters are used by Riverbank Canning Co., Riverbank, Calif., for making a 5 to 1 tomato paste. More are on order. Rated capacity of each unit, 12,000 lbs. per hour, although Riverbank's Superintendent reports that this has been doubled on many occasions.



This flow sheet is representative of an efficient tomato paste plant. Whether one or several tomato cookers are necessary, depends on the volume to be reduced per hour. Pfaudler is prepared to engineer the entire plant.

SEMI-SOLID or dehydrated, tomato paste is important to military and civilian requirements today. Packing maximum volume with minimum equipment and manpower is what Pfaudler Engineers have been helping U. S. packers do for many years.

The flow sheet above is typical of a continuous system for producing tomato paste (30% total solids) by vacuum evaporation. Pfaudler is prepared to engineer the entire production line. This assures a system integrated to the full economy of Pfaudler tomato cookers and vacuum evaporators.

Recently, an eastern packer came to us with a problem of making a 30% tomato paste. He had some equipment available that could be converted. Taking what he had, including boiler capacity, available water and other factors, Pfaudler designed a plant to pack 360 tons weekly. It represents an efficient operation.

If you have a tomato paste problem get in touch with our engineering Department at once.

If you need equipment with which to make canning brines or syrups order a Pfaudler "Kwik Mix". Available in acid resisting glass-lined steel construction, equipped with heating coil built for 100 lbs. steam pressure. Agitator with motor drive available, if desired. Four standard sizes 60, 100, 200 and 330 gallons. Same unit can be used also as preheater for juices, cooking sauces, or cooling liquids.

PFAUDLER

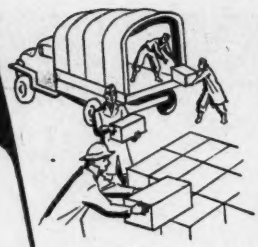
THE PFAUDLER CO., Rochester, New York. Branch Offices: 330 West 42nd St., New York; 1442 Conway Bldg., Chicago; 1325 Howard St., San Francisco; 455 Paul Brown Building, St. Louis; 7310 Woodward Avenue, Detroit; 1228 Commercial Trust Building, Philadelphia; 751 Little Building, Boston; 1318-1st Nat. Bank Building, Cincinnati

ON GUARD...

AGAINST MOISTURE-DAMAGE TO FOODS!

McLAURIN-JONES
Moisture-Resistant Food Wrap and Waterproof Tape

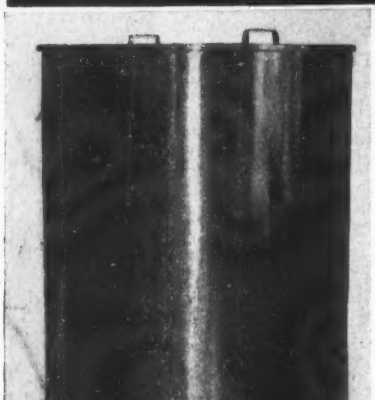
The McLaurin-Jones line of WARE-WRAP papers includes laminated as well as coated sheets, suitable for frozen and dehydrated foods, grease products, etc.



Moisture damage is a constant threat to the foods being shipped to our boys in every corner of the globe. . . . The Services of Supply must be on its toes, ready to take every precaution—be constantly *on guard* against water that might permeate these priceless cases and cartons of foods. To aid in this unrelaxing vigil come McLaurin-Jones' new Moisture-Resistant Food Wrap and the waterproof Solseal-Coated Tape for strapping and sealing watertight packages (*and provided with adhesive materials capable of withstanding the rigors of heat, humidity and cold*). They are the answer to a quartermaster's prayer for thorough protection of dehydrated and frozen foods as well as grease products for overseas shipment. . . . If you require this type of inner-liner and bag-wrap, or waterproof tape, get in touch with us *now!* We'll respond promptly with complete technical data. Or, if you prefer, we can make the necessary analyses for you in our completely equipped laboratories!

McLAURIN-JONES COMPANY
General Offices: Brookfield, Mass. • Sales Offices: New York, Chicago, Los Angeles

STAINLESS STEEL TANKS



35, 60, 100, 160, 200, 300, 400 and 500 gallon sizes

TERRISS Standard Tanks are made from 18-8 Stainless Steel. They are highly polished inside and outside with a No. 4 finish, pitched bottom and self-draining, and are furnished complete with Stainless Steel Covers. The stands may be either strong angle iron construction or pipe leg type. Built-in agitators can be supplied for either fast or slow speed.

We also build tanks to your specifications. All orders subject to preference ratings.

CONSOLIDATED
SIPHON SUPPLY COMPANY, Inc.
22-24 WOOSTER ST., NEW YORK, N. Y.

Dehydraters and other steam users...

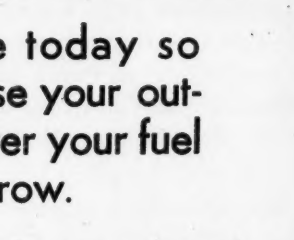
Save fuel—increase production

Investigate today so you can raise your output and lower your fuel costs tomorrow.

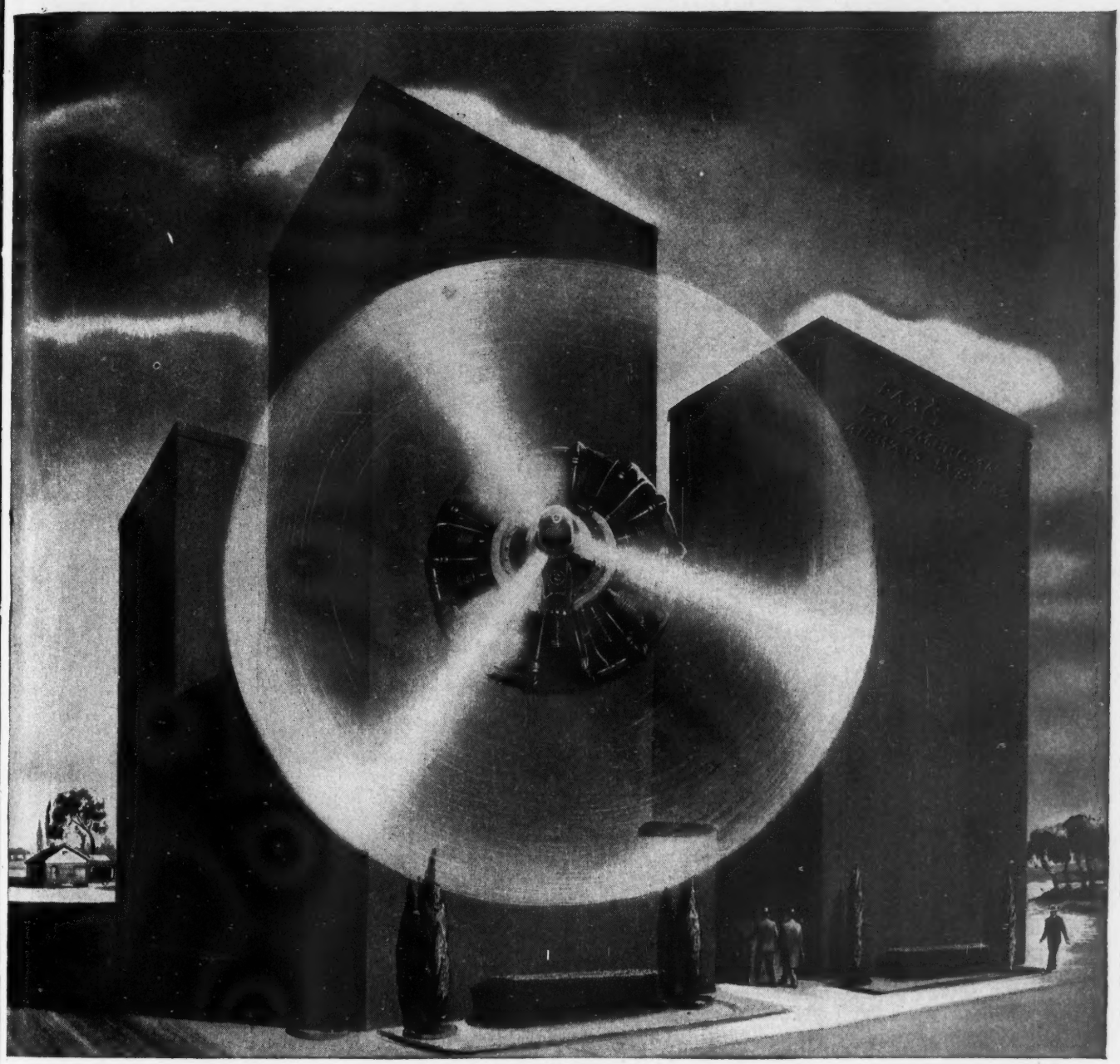
Users claim substantial increased production with

13 to 27%

savings in fuel by using ACKER Systems of Steam Drainage Deaerating and Boiler Feeding. Write for data today.



W. M. ACKER ORGANIZATION, INC.
3169 Fulton Road, Cleveland, Ohio



Cave-of-the-Winds in Miami

Inside this unique building, the engines of Pan American Clippers are put through their paces. Propellers roar with the thunder of 4000 horsepower—creating super-hurricanes as air is pulled down one set of stacks and pushed out through the other set.

Outside, there's hardly a sound—for in each stack a honeycombed unit of cells soaks up the resonance, bit by bit, until it is finally dissipated.

Naturally, this completely windowless test house had to be air conditioned—to remove heat generated by the engines, to provide controlled testing temperatures, to make working conditions bearable for the engineers. As in so many other exacting applications of air conditioning and industrial refrigeration, the equipment selected was General Electric.

Today, G-F air conditioning and refrigeration engineers are devoting all their talents to problems of war production and testing. They are learning much that will lead to better, more economical manufacturing methods—to healthier, happier living—when we return to the pursuits of peace.

Air Conditioning and Commercial Refrigeration Department, Division 437, General Electric Company, Bloomfield, New Jersey.

Air Conditioning by

GENERAL ELECTRIC

America's first superhighway—The Pennsylvania Turnpike—is performing a gigantic war service . . . a service that wasn't contemplated when this express link between the Midwest and the East was opened less than three years ago.

Here is its wartime record: 140 miles saved for more than a thousand trucks and trailers a day on hauls between the Midwest and the Eastern seaboard. 140 "scratched" miles that would be wasting tons of tires, tank cars of gasoline, thousands of valuable hours.

And after Victory, other superhighways already laid out, but not constructed, will weave the Pennsylvania Turnpike into a network of roads that will help to bring about the highly integrated transportation system that America's post-war expansion will demand. And the Trailmobiles—the new, post-war Trailmobile trailers—will roll on these superhighways, adding their improved efficiency and economy to tomorrow's faster transportation.

THE PENNSYLVANIA TURNPIKE is today a vital link in the wartime *logistics* of the United Nations. It is part of the 'round-the-globe network of Army and civilian transportation that is rushing supplies and replacements to the strategic battle-fronts of the world. If you are interested in transportation, you will want to see how its wartime development will contribute to your own post-war operations. Mail the coupon below for your free copy of "Logistics . . . the Science of Moving Armies and Supplies."

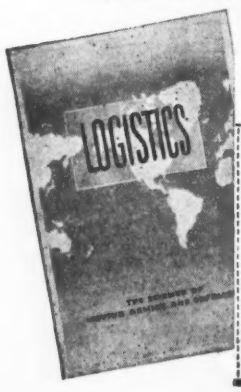
TRAILMOBILE

Commercial Trailers for War and Peace

ARMY E NAVY

THE TRAILER COMPANY OF AMERICA

Cincinnati, Ohio — Branches in Principal Cities



Send for this free booklet!

ATTENTION! ALL TRANSPORTATION MEN!

See how your job is part of the greatest transportation system ever conceived. Send for your *free* copy of "Logistics—the Science of Moving Armies and Supplies."

*Name*_____

*Company*_____ *Dept.*_____

*Address*_____

STOP

Trailer Tail Lights

Twenty large cities in the United States receives 100% of their milk by truck and trailer.

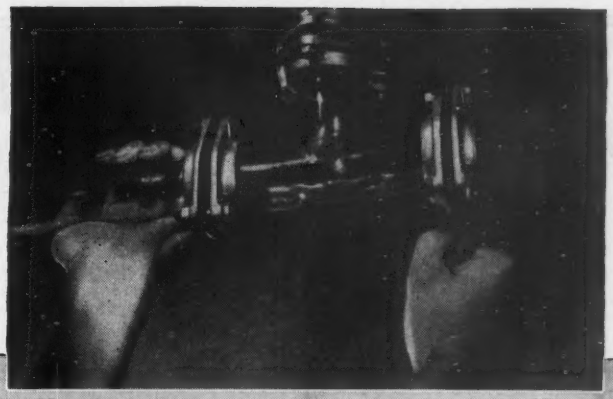
In 1917 there were 362,000 motor transports in operation. Today there are 4,911,000.

A Trailmobile now being made for our Armed Forces is used to pick up disabled bombers and rush them back to their bases for repairs.

Fruit and vegetable growers and shippers recently listed eighteen reasons why they prefer trucks and trailers in marketing farm produce.

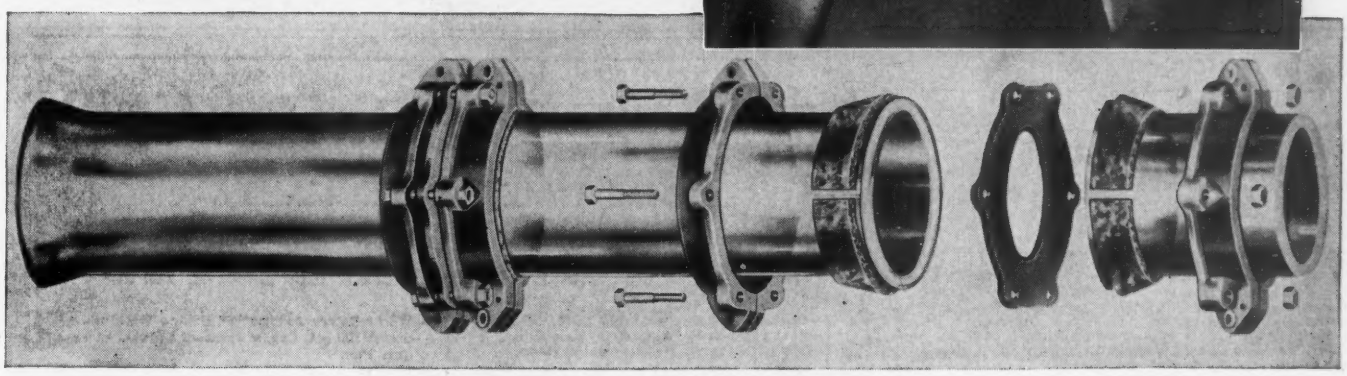
There were 40,800 civilian truck trailers produced in 1941, the last complete year before civilian production was curtailed.

What every plant operator should know about GLASS PIPING!



Q: Is GLASS PIPING easy to install?

A: Yes!



Blown-up view of 4" PYREX Piping and flanges.

Whether you need a single length or an entire piping system, PYREX Piping is easy to install. In many instances mechanics with no previous experience have done first-rate installations with PYREX Piping. Your present plant workmen can do it.

Fittings are available for joining PYREX Piping to existing lines and equipment. Metal to glass and glass to glass fittings are easily assembled. PYREX Piping is hung and supported much like other types of piping. A few simple precautions such as padding supports and hangers to minimize scratching will assure long life.

The large photograph above shows the few simple parts used to make a sturdy joint in PYREX Pipe Lines, as illustrated in the smaller picture.

IS GLASS PIPING AVAILABLE NOW?

Yes. Glass-making materials are fairly plentiful. We do need priority ratings that enable us to get accessories (flanges, gaskets), to assign necessary labor, and to establish your order in our production line. With such priorities we have been making 6 to 8-week deliveries.

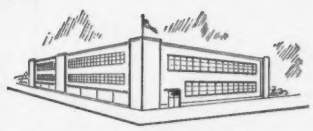
Available sizes and lengths: 1", 1½", 2", 3", and 4" diameters; any length from 6 inches to 10 feet (longer lengths on special request). There are corresponding ells, tees, return bends, and reducers.

Accessories: Compression type joints—with conical pipe ends compressed to a self-centering gasket by metal flanges and clamping bolts. We supply gaskets of materials suited to the liquid or gas you want to convey.

WHAT DOES IT COST?

The initial cost of PYREX Piping (accessories included) is about the same or less than the cost of full-weight copper or brass piping, in comparable sizes, and is considerably less than the cost of stainless steel.

And because PYREX Piping does not wear out under acid attack, it gives long trouble-free service, with resultant low long-time cost.



WHERE DOES IT GIVE BEST SERVICE?

Wherever speed and ease of cleaning are factors . . . wherever products must be protected from contamination . . . wherever it is important to know what is happening *inside* a line . . . there it is that PYREX Piping gives you its most profitable service.

Food and beverage plants use it to eliminate their corrosive problems, just as it is the first choice of chemical plants because it resists all hot or cold acids (except HF). It can be cleaned by simple flushing or with steam or strong hot cleaning solutions. PYREX Piping helps to produce a purer product with the most natural color and flavor.

WILL IT STAND UP MECHANICALLY?

Yes. PYREX Piping is recommended for working pressures up to 100 lbs. p. s. i. But glass in this form is *not* as strong as metal. So, care must be taken to avoid installation strains or sharp impact. Nearly 20 years of service under all kinds of plant conditions have proved that only simple common sense and reasonable care are required to handle PYREX Piping without trouble. The glass itself, incidentally, is very hard—about twice as resistant to abrasion as ordinary plate glass. Thus, the piping is particularly suitable for abrasive, corrosive slurries. You can install and use PYREX Piping with confidence.

WATCH FOR CORNING ADVERTISEMENTS!

Watch this magazine for more information in Corning's advertisements headed "What every plant operator should know about Glass Piping." And Write for PYREX Piping Bulletin No. 814. Industrial Division, Corning Glass Works, Corning, N. Y. Branch Offices: New York, 718 Fifth Ave.; Chicago, Merchandise Mart.

"PYREX" is a registered trade-mark and indicates manufacture by Corning Glass Works Corning, N. Y.

CORNING
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Pyrex Industrial Glass
BRAND

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10 cents a word, minimum charge $2.00. (See ¶ on Box Numbers.)
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BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.
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The advertising rate is $6.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.
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NEW ADVERTISEMENTS received by 10 A. M. June 18th will appear in the July issue, subject to limitations of space available

POSITIONS VACANT

WANTED—Man to supervise and take charge of maintenance and repair work in large dry milk plant. Plant does not generate own power. Will have charge of firemen and engineers and all maintenance men. 24 hour operation, 7 days per week—responsibility. Good salary and permanent position for proper man. Must have Engineer's license. P-134, Food Industries, 520 N. Michigan Ave., Chicago, Ill.

WANTED: Production Executive by substantial prominent Eastern food manufacturer having above average industry position, and now war-classed "essential." Position offers exceptional present and post-war potential advancement possibilities. Vegetable canning experience helpful but not necessary. Application must include complete record, entire past experience and sufficient personal detail for us to determine whether worthwhile interviewing. Replies held strictly confidential. Our organization knows of this advertisement. P-147, Food Industries, 330 W. 42nd St., New York, N. Y.

FOOD TECHNOLOGIST—experienced for technical field service work in canning industry. Give all details and salary expected. P-148, Food Industries. 330 W. 42nd St., New York, N. Y.

BACTERIOLOGIST — experienced in canned foods spoilage investigation. Give details and salary expected. P-149, Food Industries, 330 W. 42nd St., New York, N. Y.

FOOD TECHNOLOGIST for research laboratory of well established midwestern manufacturer of essential food products. Permanent position with excellent opportunities for advancement. In reply, furnish small, recent photograph and particulars concerning personal history, education, experience, draft status, and salary desired. P-150, Food Industries, 520 N. Michigan Ave., Chicago, Ill.

PICKLE MAN—Must be thoroughly experienced in brining and processing to finished product. Good position with excellent future. Goodman Bros., 24 Miller St., Meriden, Conn.

WANTED — Experienced production superintendent for dehydration plant in northwest. Potatoes and onions chief products. P. O. Box 8135, Market Station, Los Angeles, Calif.

FOR SALE

FOR SALE: 1 Sterling Model 32 Vegetable Peeler with motor. 1 Figure 2098 Urschel Centrifugal slicer with motor. FS-151, Food Industries, 68 Post St., San Francisco, Cal.

New Jersey Manufacturer has available, for either part or full time, vacuum cookers, filter presses and vacuum dryers, which could be converted to food manufacturing. If interested, write

CW-145, Food Industries
330 W. 42nd St., New York City

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AND

SAVE TIME TO THE LIMIT!

BUY "CONSOLIDATED"

- 1—Pneumatic Scale Packaging Unit.
- 1—Pneumatic Scale Automatic Wax Liner.
- 2—300 gal. Copper closed tin-coated Tanks.
- 1—J. H. Day #2 Brighton Mixer, 80 gal. cap.
- 6—8 to 40 gal. Pony Mixers.
- 15—Dry Powder Mixers, from 50 to 4000 lbs.
- 1—National auger type auto. Powder Filler.
- 2—80-qt. Century 4-speed Mixers, m.d.
- 1—28"x60" double drum B & C Atmospheric Dryer.
- 1—Buffalo 24" Vanilla Bean Chopper.
- 4—World, 1-Ermold semi-auto. Labeling Machines.
- 2—Karl Kiefer Visco Filling Machines.
- 1—Johnson mod. JA Cellophane Wrapper.
- 11—Filter Presses P & F; Recessed; to 42" Square.
- 2—World Rotary Automatic Labeling Machines.
- 1—Stokes 500 gal. Copper Jacketed agitated vacuum Pan.
- 2—Mechanical 4x9' Lard Rolls, m.d.
- 3—Sweetland Filters, 1—#6, 1—#7, 1—#12.
- 17—Stainless Steel, Copper; Glass Lined; Kettles and Vacuum Pans, up to 550 gal. cap.
- 2—Schultz-O'Neil Pulverizers.
- 3—K.K. & U.S. Rotary bottle Rinsers, m.d.
- 1—5x35' Louisville Steam Tube Dryer.
- 1—Elgin 12-spout Rotary Piston Filler, S.S.
- 12—Copper Tanks to 7000 gal.
- 1—Johnson T & B Sealer Unit.
- 2—O. & J. 7-place Rotary Labelers, m.d.
- 4—2"x2" Bronze Rotary Pumps, m.d.

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FOR SALE

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One single compartment tunnel type drying oven, practically new. Inside dimensions—10' 9" wide by 51' 0" long by 8' 11" high. With floor type chain conveyor system to accommodate two lines of trucks. Walls and roof consist of 4" thick steel panels filled with glass wool insulation. Each end is fitted with two sets of double doors equipped with safety catches. Heating system consists of two separate oil fired remote furnaces with recirculating heat fans, one for each end of oven. Each furnace is equipped with automatic combustion and control systems fitted with complete automatic ignition and safety flame protection.

FS-152, Food Industries
330 West 42nd St., New York City

WANTED

WANTED

2—Tablet Machines; 3—Filters.
2—Dry Powder Mixers, with or without Sifters.
2—Rotex Screens; 1—Packaging Machine; 1—Glass Lined Kettle; Stainless Steel, Monel, Copper or Aluminum Jacketed Kettle and Vacuum Pan.

W-132, Food Industries, 330 W. 42nd St., N. Y. C.

APPLE CIDER PLANT WANTED!

All Cash Transaction. State details.

W-153, Food Industries
330 W. 42nd St., New York City

M.V.P. Glassine Available

Small quantities monthly.
Excellent test.
Write for samples.
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Up to 5000' roller gravity conveyor for cash. Send detailed description and price to the

Island Equipment & Supply Co., Inc.
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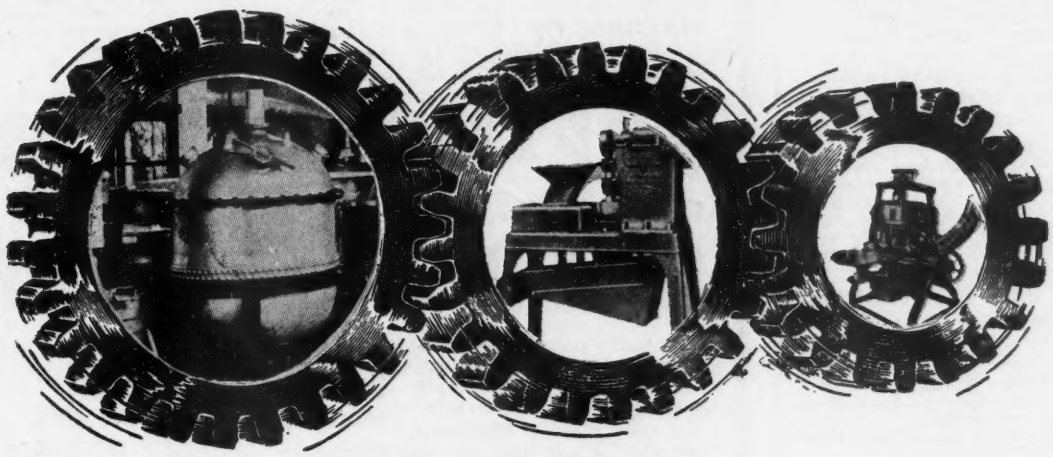

We reclaim machines for strategic WAR WORK in FOOD INDUSTRIES. W.P.B. points to rebuilt machinery as one of the most vital factors in conservation.

Draw from our vast resources of "really rebuilt" equipment to meet your essential needs.

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2 Samco Jr. automatic Fillers

8 Powder Fillers; Stokes & Smith, Natl. Packg., Pneumatic Scale Eureka, F. J. Stokes automatic & Semi-automatic Fillers & Packers

7 Pressure Fillers; Kiefer, Haller, Fowler; for juices, syrups, vinegar, etc.

3 Merrill Soule 6 spout Fillers for varying products and containers

1 Filler Machine Co. 4 piston Filler; 1 progressive 6 Spout Filler

1 Ayers 12 valve stainless Filler, tomato juice into #211 Cans

2 Standard Automatic 12 Spout and 15 Spout fully automatic vac. Fillers

KETTLES & TANKS

6 Copper jktd. (and coils) Vac. Pans up to 500 gal. capacity

8 1000 gal. Copper closed top Tanks

100 New and Rebuilt copper steam jktd. Kettles from 30 gal. to 500 gal.

6 Chrome Steel Jktd. and Agitated 1200 gal. Tanks or Kettles

MIXERS

15 New and Used Dry Powder Mixers, from 200 lb. to 2000 lb.

MILLS & PULVERIZERS

6 Schutz O'Neill Sugar Mills or Pulverizers

2 Mikro No. 4 Pulvizers; 24" complete with motors

PACKAGING MACHINERY

1 Package Machinery Corp. Cube Wrapper

15 Bottle & Jar Labelers; Ermold, National World, O.&J.

8 Can Labelers, sizes up to #10 Burt and Standard Knapp

1 Pneumatic Scale 6 Head full automatic Cappers

3 Capem 4 Head fully automatic Screw Cappers; Fred Goat Capper

MISC. FOOD PROCESSING EQUIPMENT

6 Kiefer & U. S. Bottle Washers and Rinsers

4 Sterling Potato Peelers; No. 16 and No. 28

2 Buffalo No. 9 Kraut Cutters; 5 Simplex Cabbage Corers

1 Buffalo Bean Chopper; 5 Enterprise and Buffalo Meat Choppers

3 Juice Extractors & Pulpers; with non corrosive contact parts

2 Rotary Tomato Washers; 2 Scalders (one inclined, one straight)

SPECIAL LOT OF APPLE EQUIPMENT including Cider Presses, Slicers, Corers, Graders, Pomace Separators, Apple conveyors, Hoists, Elevators, Bucket Elevators, Trucks; Storage Tanks, Portable Agitators, & General Factory Equipment.

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★ SELECTED BUYS
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Cooker Cooler Exhaust Box, for #10 cans, large capacity.
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Kettles, Tilt type 10-30 Gals.
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Tomato rotary preparation table.
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★★

Specialists in all types of food machinery
Let us know Your specific needs

★★

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Single Items to Complete Plant

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2—4x6′ Buffalo Vacuum Drum Dryers.
2—Triple effect Evaporators.
1—Berlin-Chapman 15-pkt. Syruper-Filler
5—Attrition Mills—18, 22 and 30″.
1—2-roll Raymond Roller Mill.
2—Karl Kiefer Visco Fillers.
1—Urie Universal Filler.
6—±600 DeLaval Clarifiers.
1—World automatic rotary Labeler.
2—Rotary Bottle Rinsing Machines.
2—M&S Universal Filling Machines.
1—#6 style B Peerless rotary Exhauster.
6—20 gal. Jack. Copper Tilting Kettles.
1—48x54″ Fort Wayne Sterilizer.
Dough and Powder Mixers, Bottle and Can Fillers, Filters, Filter Presses, Mills, Dryers, Pumps, Boilers.

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SERVING AMERICAN INDUSTRY FOR OVER 25 YEARS

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9 **Quality Separation by Differences of Density**—a unit operation of food engineering—by the editor of Food Industries, Dr. L. V. Burton. This is a specially bound, 15-page article of interest to all food manufacturers. Contains 16 charts, diagrams and photographs, 35 cents each.

11 **Magazine Feeds Solve Some Package Wrapping Problems**—Methods of feeding packages to the wrapping machines—type and rate of production determine what kind of feed should be used—construction and operation are explained in detail. Reprinted from Sept. 1936 issue. 10 cents each.

12 **Materials Handling**—Every branch of the food industries uses this operation to reduce manufacturing cost and coordinate processes. This article covers practically anything that cannot be handled in pumps. Reprinted from October 1936 issue. 10 cents each.

15 **Centrifugal Separation**—A unit operation that permits economy in the separation of solids or liquids from other liquids, strictly mechanically. Descriptions, types and uses in the food industries are discussed. Reprinted from April 1937 issue. 10 cents per copy.

17 **Minimum Quality Standard for Canned Tomatoes**—as issued by the U. S. Dept. of Agriculture, Food and Drug Administration—with authentic color swatch. Price 10 cents each.

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20 **Public Relations for Industry**—a presentation of the imperative needs of mutual understanding in the conduct of our daily work . . . with special reference to the food industries. 10 cents each.

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32 **A symposium by some of the couuntry's leading authorities on Consumer Research**—reprinted from the March, 1941 issue. It tells how to secure a true picture of consumer reactions to your products and how to interpret these facts in adapting your product to meet their requirements or staisfy their particular preferences. 20 cents per copy.

33 **U. S. Inspection and Grading** — Published originally in the May, 1941 issue of Food Industries, this 32-page reprint contains seven important articles profusely illustrated with photographs from the field. Article titles include: "First User of A.M.S. Tells Why"; "Manufacturers' Brands Benefit From A.M.S. Shield on Labels"; "A.M.S. Inspection Means More Sales at a Profit"; and "What's Behind U. S. Inspection and What It Involves". 20 cents per copy.

34 **How to Control Vitamin Content**—a 32-page symposium of experience with vitamins in foods on an industrial scale reprinted from June, 1941 (32 pages) and July, 1941 (12 pages). Both sections, while they last at 50 cents per set.

35 **Controlled Atmospheres**—Why "controlled atmospheres" are important to you; what they can do for you, and opplications in the Food Industries. 48 pages. Reprinted from June, 1936 issue. 25 cents each.

37 **Preference Ratings Are Your Job**—Eight pages. Priorities and allocations. What to look for and how to make the most of your findings are told in this article. Reprinted from January 1942 issue. 20 cents each.

38 **Protect Your Plant from Bombs and Sabotage.** Food Processing plants must guard against air raids and sabotage because it is a war necessity to keep the production of processed foods at a high level to feed the armed forces and civilians of the United Nations. Effective plant protection, setting up lines of authority, and duties within the plant are covered in this article reprinted from February 1942 issue . . . 4 pages. . . . Free of charge.

39 **Food Must be Packaged . . . Even in Wartime.** Restrictions on materials have made packaged difficult. The largest food production in this country must be packaged in 1942. Many things can be done and are being done to alleviate the situation. . . . 12 pages summarizing the steps being taken by manufacturers of packaging materials, packaging machinery, food packers and the government. Reprinted from April 1942 issue. . . . 12 pages. . . . 25 cents per copy.

40 **Flow Sheets of the Food Industries.** Developed by Food Industries and specifically designed for production men to give them basic information on standard processes in use throughout the food processing field. Size, 8½ x 11 inches, attractively bound in paper folder. 36 pages. . . . 50 cents per copy.

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24" Pebble Mill, belt drive.
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Read 80 qt., Hobart 80 qt., Century 30 qt., and Read 12 qt. Vertical Mixers.

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COPPER VACUUM PANS, 5 to 60 gal., with coil condensers.
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We have no connection with any other company.

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50 gal. Alum. Direct Fired Kettle, agit.
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1½ bbl. Dough Mixer, 3 H.P.
80 qt. Hobart Mixer, 2 H.P.
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2" Buffalo Centrif. Pump, 7½ H.P.
6 ft. Copper Vacuum Pan & Condenser.
60 to 400 gal. Homogenizers or Viscolizers.

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Davidson Wet Vacuum Pump 3½ x 4 x 4.
Several used Copper Steam Jacketed Kettles.
3 HP Elec. Motor D.C. 575 rpm perfect.
One 10 HP Kane gas fired steam boiler almost new.

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Type M-NS-66; Serial 36-66-996, for separating emulsified liquids. Good condition; available for immediate shipment.

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Horne-Ash Machinery Co., Inc.
Food Packing Engineers
Write for Stock List of
Used and Rebuilt Equipment
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FOR SALE

Used hydraulic presses for apple and other juices; used wooden filter presses, 32", 18" and 12" square, good condition; one used 24" square hard rubber filter press, 30 chambers; used bronze pumps; labeling machines.

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SPECIAL
Just Received

2—Pneumatic Scale 24 spout vacuum type filling machines.
1—Elgin 6 head vacuum type liquid filling machine directly connected with Elgin Screw Capper

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48" Copper Vacuum Pan, jacketed, complete with condenser, vacuum pump, etc., also 20 to 300 gal. sizes.

Wolf Steam Dryers consisting of 6 steam jacketed tubes with spiral ribbon conveyors.

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Johnson, Automatic Packaging Unit, for setting up, filling and closing cartons.

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Including cartoning units, filling and wrapping machines—all types, makes and sizes in stock

We Pay Cash For Single Machines Or Entire Plants

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12—Iron and Bronze Centrifugal Pumps
4—Pneumatic Scale Automatic Straight Line Labelers
12—Copper and Cast Iron Columns 7" to 72"
5—Copper Spray Towers 8'6" dia. x 32' high
23—Wood Storage and Fermenting Tanks, 130 gal-7000 gals. Still set-up
2—100'-10" Bucket Elevator and 120'-8"
40—100 gal. Galvanized Spice Hoppers, on Casters, with Discharge Valves
1—Worrell's 3' dia. x 18' long Rotary Steam Dryer
1—Sperry Filter Press 24 x 24 Aluminum
1—Shriver Filter Press 36 x 36 Cast Iron
2—Crossley Filter Presses 24 x 24 Cast Iron
22—Glass-Lined Sectional Tanks 750-19000 gals.
25—Vertical Copper Tanks 50-8700 gals.
30—Horizontal Steel Tanks 4650-9300 gals.
1—Burt Multiple Series A—Can Labeler
1000'—Double Pipe Coolers

Write for Latest Stock List

Perry Equipment & Supply Co.
1515 W. Thompson Street, Phila., Pa.

FOR SALE

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1—Buflovak 5' x 6' Atmospheric Drum
1—Vulcan 6' x 42' Rotary
1—2½' x 10' Rotary Vacuum
2—Scott 3' x 8' Rotary Vacuum
1—Atmospheric Double Drum, 4' x 9'
7—Rotary 3' x 30', 4' x 30', 5' x 35', 6' x 65'
2—Hersey Rotary Indirect 5' x 25', 6' x 25'
2—Carrier 12 truck atmospheric

KETTLES—PANS—EVAPORATORS

3—Swenson Triple Effect Evaporators
1—Buflovak No. 55 Triple Effect Evaporator
1—3' Stokes Copper Vacuum Pan, agitated
1—Buflovak Impregnating Kettle, 42" x 60"
3—Copper Vacuum Pans, 2'6", 6', 7' dias.
1—Badger 1000 gal. Copper Still
25—Copper Jcktd. Kettles, 10 to 300 gals.
9—Steel Jcktd. Kettles, 50 to 2000 gals., agitated
1—Pfaudler 42" dia. 108" high, glass lined jktd. vacuum pan with copper coils

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1—Tolhurst 40" Suspended, with 10 HP AC motor
5—Tolhurst 40", Suspended, with 15 HP motors
3—Tolhurst 40", 48", 60", center slung
1—Tolhurst 40", with 7½ HP motor
7—Tolhurst 32", 40", 48", 60", self-balancing
6—Sharples No. 6
1—Sharples Lab. Centrifuge
4—De Laval Nos. 200, 500, 600, 700

MIXERS

1—W. & P. 50 gal.
1—Day No. 30 Imperial Jcktd., 75 gal.
5—Change Can, 8 to 40 gal.
1—Day Universal, Jcktd., 265 gals.
20—Day Powder Mixers, 25 to 2000 lbs.
5—Hobart and Century Vertical Cream Mixers
6—Ross, Day, Read, Lab. to 350 gal.

FILTERS

1—Oliver 36" x 36", cast iron, 41 chambers
1—No. 5 Sweetland, 30 copper leaves, 2" centers
1—No. 7 Sweetland, 21 leaves, 3½" centers
3—12" Ertel Disc Filters
1—Sperry 36" x 36", cast iron, 41 chambers
10—Shriver Skeletons, 12" to 36" square
8—Kilby 30" x 30", cast iron, 38 chambers
5—Oliver Rotary, 4' x 6' to 12' x 12'

PULVERIZERS—GRINDERS

5—Raymond No. 0000, 00, 0, 1, 3
7—Hammer Mills, Williams, JayBee, Jeffrey, 5 to 100 HP
5—Mead Mills, Nos. 1, 2, 3
1—Schutz O'Neill No. 3 Sugar Mill
15—Pebble Mills, Lab., to 300 gal.
6—Roller Mills, Lab., to 16" x 40"
6—U. S., Premier Colloid Mills, ½ to 100 HP
1—10" Premier with 20 HP AC motor
3—Schutz O'Neill Mills, 20" to 28"

TANKS

5—Sectional Brewery, 8' to 10' dia.
10—Glass Lined, 50 to 1500 gals.
15—Steel Storage, 3500 to 15,000 gal.
2—20' x 20' Open Top Steel

FILLING & PACKAGING EQUIPMENT

3—Stokes, Stokes & Smith Powder Fillers
2—Kiefer Visco Fillers
4—Knapp, Burt Can Labelers
10—Ermold, World, National Semi-Automatic Labelers
2—World, International Automatic Labelers
1—Kiefer 8 spout Vacuum Bottle Filler
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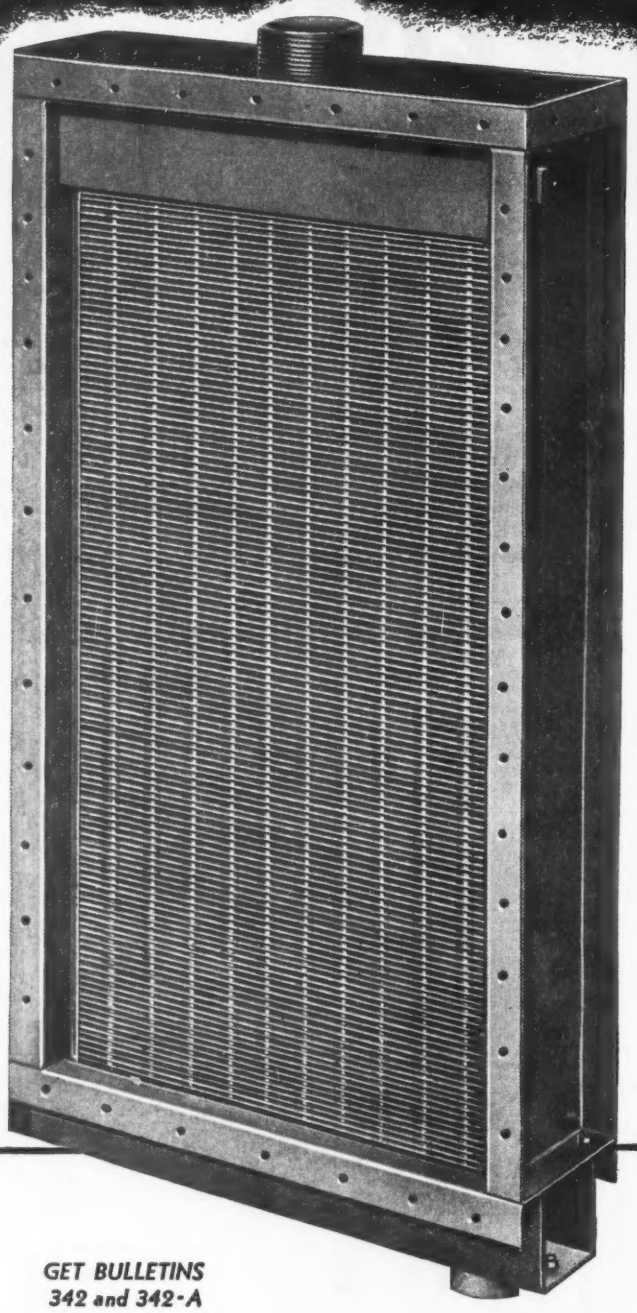

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